TWO SECTIONS — SECTION I

S·A·E JOURNAL

S-1932

SUMMER MEETING

JULY 1932

The rear seat becomes as good as the front!

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The use of softer front springs, long recognized by Engineers as the outstanding need to iron out the roughness of the rear seat ride, has finally been made possible.

A car acts exactly like a teeter-board—snappy up and down movements caused by stiff front springs are felt equally by the radiator and by the rear seat passenger—the front seat passenger is at the middle of the board and is not disturbed.

Softer front springs completely change these movements—instead of being snappy they become slow and lazy—the rear seat passenger then, instead of being thudded and jerked over the roads, floats along in easy, unabrupt undulations. The rear seat becomes as good as the front!

The spectacular and infallible gyroscopic control resistance provided by the coming Watson Double-Acting GYRO Stabilators makes possible, with certainty and with safety, the standard use of softer front springs than have heretofore been attempted even experimentally.

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JOHN WARREN WATSON COMPANY
PHILADELPHIA, PA.

J. W. Watson

PRESIDENT

S·A·E· JOURNAL

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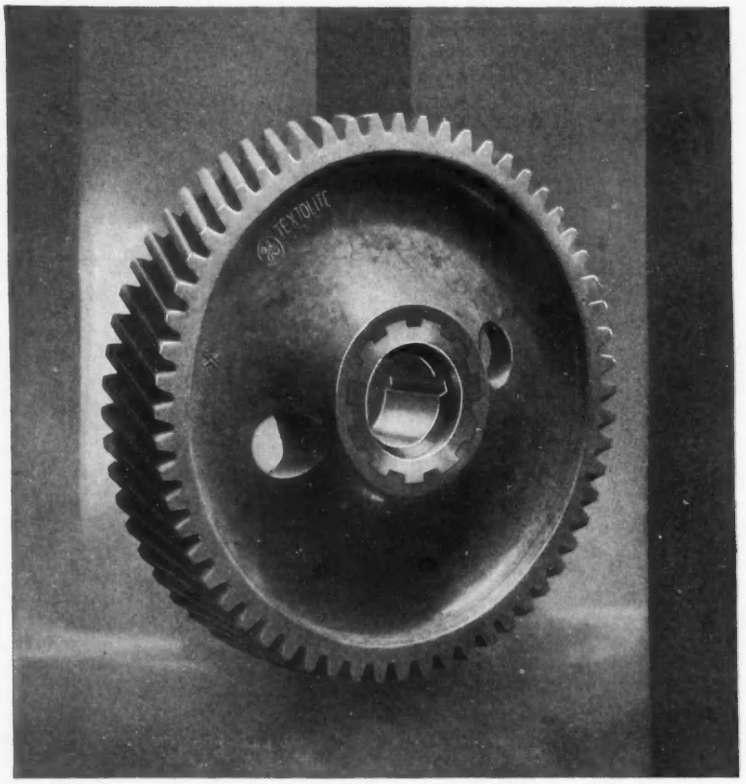
The purpose of meetings of the Society is largely to provide a forum for the presentation of straightforward and frank discussion. Discussion of this kind is encouraged. However, owing to the nature of the Society as an organization, it cannot be responsible for statements or opinions advanced in papers or in discussions at its meetings. The Constitution of the Society has long contained a provision to this effect.



Quiet? Yes! And good for 50,000 miles

IS elimination of noise your first consideration? Nonmetallic gears give it. They are highly resilient, nonresonant and yielding, and they eliminate metal-to-metal contact. They "soften" the entire engine.

TEXTOLITE TIMING GEARS

Is *better performance* your first consideration? Nonmetallic gears give it. They *maintain* synchronization between crankshaft and camshaft, not merely when first installed, but for 50,000 miles and more of service.

830-105

GENERAL ELECTRIC

Stout Ridicules "Dumb Design Traditions"

Distinguished Aircraft Authority at Summer Meeting Exposes Musty Practices and Advocates a New-Type Car

ACCORDING to W. B. Stout, Aircraft Engineering Vice-President of the Society, automobile designers have a lot to learn from their brothers in the aircraft field, especially regarding light-weight efficient construction. Repeating a statement that he made before the S.A.E. 20 years ago, Mr. Stout based the burden of his Summer Meeting address this year upon the text, "The Lighter a Car Is, the More Comfortable and Economical It Can Be Made." Automobile designers, he said, must shake off the heavy weights of "dumb design" and build cars that are in line with uptodate knowledge and improved practices—cars whose characteristics and features satisfy more completely the legitimate desires of an educated public.

Aircraft designers have a greater incentive, perhaps, than automobile designers to apply the process of structural analysis more carefully to their product, but there is every reason why the automobile designer should take full advantage of the same tool. Considerable weight could be eliminated by the intelligent use of suitable structures, unsprung weight could be reduced and a car with better road behavior, greater comfort and better controllability would result. Mr. Stout suggested further that weight reduction should naturally be accompanied by the elimination of unnecessary parts and gadgets and the simplification of control. The product should provide more luxurious, safe and economical transportation at an appreciably reduced cost.

Promises Grief from "Tear-Drops"

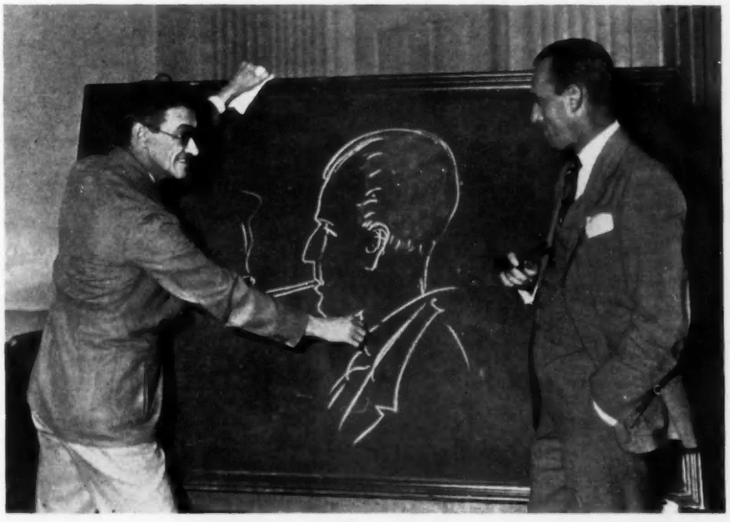
Mr. Stout said he believes that a proper inference is carried by the name "tear-drop" as it is applied to certain types of streamlined cars. "You can't streamline a car like an airplane," he said, "owing to the fact that the air doesn't always come from the front." Proper streamlining of an automobile must take care of side-wind effects which tend to force the car off the road.

Passengers should ride between the axles, not over them, for greatest comfort. They should ride "eye high" for greatest confidence. Low cars give the sensation of being stepped upon, whereas the high-riders give a falling-off effect.

Waste space, which comes from lack of forethought, robs the owner of 50 per cent of the possible luxury that he should get from a given wheelbase. Less than one-fourth of the car plan-area or "acreage," as Mr. Stout termed it, is delivered to the customers.

Before Meetings Committee Chairman Norman G. Shidle brought the session to a close, Mr. Stout denied that he regards automobile engineers as "a rather dumb lot." He admitted the lack of vision and courage on the part of many executives and said with reference to the engineers, "my only thought is that they persist in designing a lot of dumb things into automobiles — or rather have neglected to design them out."

Although Vice-President Stout set a fast pace for Summer Meeting



W. B. STOUT, CARICATURING NORMAN SHIDLE, SHOWS WHAT HE MEANS BY "EYE APPEAL"

Some Stout Sales Tips

(1) Why not offer 17 cylinders? It's new! Hasn't been done by anybody! Why not go the 16's one better? You have the public sold on cylinders.

(2) Now you are selling the public on poundage. Diamonds, $1,000,000 a pound; Beefsteak, 38 cents; Cars, 28 cents.

Why not buy sand?

technicalities, the speakers who appeared at the 10 sessions that followed were eminently successful in upholding the high standard. All factors considered, the attendance at the sessions was excellent and many useful facts came out in the discussion.

Of considerable importance was the work accomplished by the numerous committees.

Credit for the success of the White Sulphur Springs meeting belongs to President Scaife, his officers, Councilors and committee members whose names and faces appear on the pages of this issue.

Stout Advice to the "Brass Hats"

"You executive, this is a technical age. Get technical in your art lines as well as in your so-called streamlines. Find out from the ladies of the chorus, if you will, just what fundamentals of line, form and color make a product attractive; but don't put them into alcoholic solution as a background for selling a product!"

The Public Be Pleased!

Keynote of Truck Men Analyzing Transport Problems—Railroad Cooperation Advocated

J. W. COTTRELL, of the Chilton Class Journal Co., introduced his paper, The Use of Trailers with Motor-Trucks, at the Transportation and Maintenance Session on Monday morning, at which L. V. Newton, of the Byllesby Engineering & Management Corp., presided, by saying that one of the standard dictionaries defines a trailer as "a light two-wheeled vehicle towed by a motorcycle or bicycle."

Mr. Cottrell treated mainly the semi-trailer and the full trailer. The former was considered as a vehicle towed and in part carried by a tractor power-unit; the full trailer, as an independent vehicle having four or more wheels and towed but not supported by the power unit.

Statistics for trucks and trailers used in 1931 were presented. Legislation was named as the first factor that determines whether trailers can be used to advantage, because, if trailers are prohibited, that ends the matter. Other factors are grades, road conditions, load characteristics, loading and loading problems, length of haul, time available from shipping platform to receiving platform and convenience of the shipper.

Legal restrictions on trailer usage were cited, substantial savings resulting from the use of trailers were pointed out, the practice of hauling "ferry trucks" or trailers by tractor to railroad stations for loading upon specially constructed flat-cars was commented upon, and consideration was given to trailer transfer of less-than-carload freight between freight stations of different railroads at a railroad center. Suitable types of trailer were enumerated. Also, the difficulties incident to designing practical coupling mechanisms and fifth wheels that afford interchangeability as to coupling with different makes of trailers were considered.

Legislation Cramping Operators' Style

A large part of the discussion that followed the paper related to the increasing restrictions on motor transport and especially on trailer operation, by legislation, much of which is induced by the influence of railroads and the public resentment created by the vehicle operators who misuse their equipment on the roads and, in many instances, operate improper equipment. As an example of the latter, vehicles in combinations 85 ft. long were cited, this probably being one of the main objections.

WHAT *IS* A TRAILER?

J. W. Cottrell, Speaker at the Transportation and Maintenance Session, Elucidates for Chairman L. V. Newton

Several discussers referred to a recent ruling of the United States Supreme Court to the effect that States can legislate restrictions on motor transportation to protect the railroads, which was emphasized as a very serious matter.

Expansion in the use of the heavy types of vehicle was regarded as about over, largely on account of the limitations of the roads and the difficulty of maneuvering such vehicles, especially in trains. Concerning the volume of hauling that can be done over good roads by trains, referred to by Mr. Cottrell, it was stated that this is definitely limited by the difficulty of operating on city streets.

One of the constructive suggestions put forward, especially regarding the legislative situation, was that the industry should organize itself more thoroughly to place the truth regarding motor transport before the people to overcome their prejudices and strengthen the influence of public opinion toward bringing about legislation that will be more favorable to legitimate expansion of motor transportation. It was stated that the railroads could also do much in this direction if the executives would realize that the motor-truck is more complementary to rail traffic than competitive. The return of rail traffic is proportional to prosperity of the

Country; this can be gaged by the volume of its transportation of passengers and freight.

Rate War Upsets Rate Structure

Regarding comparative costs, also mentioned in the paper, it was stated that the railroads, who cut rates in the attempt to recover traffic, overlook synchronization between store-door delivery and shorter delivery time made possible by motor-vehicles. It was predicted that Mr. Cottrell's rate structure will be upset as truck operators decrease the L.C.L. and container rates to meet decreased rail rates.

The shippers of freight by low-cost contracts with operators who have neither suitable equipment nor trained personnel were criticized as being responsible for the growing public resentment against heavy-duty trucks and trailers on the roads. Much of this equipment is not well engineered for its work and is becoming too old for safe operation. The saying, "A truck can pull more than it can carry," was criticized as not true and of little importance but as beclouding the issue in the selection of equipment in many instances. The requisites in selecting trailer equipment are the economies, safety and maneuverability of the equipment, depending on the roads and type of load.

Public Dislikes "Snaking Trains"

Many operators were held responsible for the traveling public's fear of heavy-duty motor-vehicles because of having to pass bulky, snaking vehicle trains, with danger of being forced off the road or into collisions. Use of lighter equipment was advocated for all operations where it can be used equally well or to better advantage than the heavier equipment. One of the remedies suggested is the education of shippers and operators to keep their heavy and bulky equipment off the roads on Sundays and holidays when so many private cars are using all the highways. Another remedy that will have to come will be classified highways, each limited to its own type of motor-vehicle, and other restrictions such as loads and speeds.

Lack of Standardization a Handicap

Discussion of the trailer manufacturers' problems indicated that the lack of standardization of fifth wheels has introduced selling difficulties and handicapped operators by limiting interchangeable connections among semi-trailers. Competition, legislation and reclaimed equipment also have become a serious problem, and the thought was expressed by one of the trailer manufacturers that within a few years the trailer business will be controlled by the larger motor-truck organizations. Regarding fifth-wheel connections, the hope was expressed that a standard will be developed, through the Society, which can be used by all the trailer manufacturers without preventing any from developing his own line of products.

J. F. Winchester added much to the value of the meeting by showing a very interesting motion picture of truck and trailer operations in the oil fields for the moving and setting of heavy oil equipment.

Stout's Car Specifications

Interior—More space, luxury, comfort than in present cars

Power—Multi-cylinder, high-speed, soundless, vibrationless engine at all city speeds. About 20 lb. per hp. for complete car, loaded. Engine, 50 to 100 hp.

Complete Weight—Less than 1000 lb.

Steering—Effortless

Control—Centrifugal clutch, working with throttle and no other connections

Acceleration—0 to 60 m.p.h. in 8 sec.

Economy—30 miles per gal.

Body—Streamlined, fixed windows and enclosed wheels

Comfort—Forced ventilation, with cooling system for summer touring

Tires—26 x 10 or the equivalent

Price—Around $2,000 on small production

NOTE—A new type of sales organization and advertising line-up should market this car on a fact basis.

High or Low-Pressure Brakes?

Operation and Application of Air Brakes Compared by Truck and Trailer Engineers

DEVOTED to the application of air and vacuum braking systems to motor-trucks and trailers, the Motor-Truck and Motorcoach session included a discussion of air brakes by S. Johnson, Jr., of the Bendix-Westinghouse Automotive Air Brake Co., and the vacuum type by R. P. Breese, of the Bragg-Kliesrath Corp. M. L. Pulcher, of the Federal Motor Truck Co., presided.

Mr. Johnson, in presenting his paper, said that low air pressure was adopted for automobile brakes because of the advantages that have been found during years of operation on steam and electric railroads. Difficulties with accumulators using pressure from the engine cylinders indicated the need of an air compressor. The first type of compressor used had a rotary inlet valve and was made as small as possible to facilitate mounting. The present type is larger and simpler, the air inlet being through piston-controlled ports and the lubrication coming from the engine oiling system.

Other essential parts of the system are a governor, which usually maintains the air pressure between 90 and 75 lb. per sq. in.; a foot-operated valve containing a heavy regulating spring, which controls the application of the brake according to the pressure of the foot, and diaphragm

A DECELERATING COMMITTEE

(Left to Right) M. L. Pulcher, Chairman of Motor-Truck and Motorcoach Session; R. P. Breese and S. Johnson, Jr., Speakers on Power Brakes for Trucks and Trailers

chambers to operate the brake rods. A worm and gear adjustment is provided to regulate the slack or brake clearance.

Trailer Air-Brake Equipment

Equipment for trailers includes a relay-emergency valve, a reservoir and brake chambers. The valve relays the braking action from the truck to the trailer and causes an automatic brake application if the trailer becomes detached from the truck. The trailer reservoir is charged from the truck reservoir through a line passing through the emergency portion of the valve.

A hand-operated valve in the cab of the truck controls an independent application of the trailer brakes, to prevent any tendency for the trailer to overrun the truck on a grade. The author calls for standards to synchronize the braking effort of trucks and trailers, suggesting that it be in the form of a ratio between the total force applied against the drums and the empty weight of the vehicle.

To provide modern brakes for trailers not fitted with power brakes, a tubular replacement axle has been designed that is complete with hubs, bearings and air-brake parts.

Two Vacuum-Type Systems Used

Vacuum-type brakes, described by Mr. Breese, are used as boosters to supplement the effort of the driver in applying mechanical or hydraulic brakes. The ratio between muscular and mechanical effort can be varied in design, and it is not unusual to derive 70 or 80 per cent of the pull from the vacuum booster.

Two systems are in use, described as air-suspended and vacuum-suspended types. In the first, air is drawn into the manifold from one side of the booster piston when the brake is applied. In the vacuum-suspended type, air is exhausted from both sides of the piston when the engine is started, and the vacuum so created is maintained by a check-valve. Air is admitted to one side of the piston for application of the brake.

The air-suspended type is limited in capacity to a booster requiring a volume of air equal to about one-third of the piston displacement of the engine. The vacuum-suspended type suffers no such limitation, and boosters are made up to a volume of 680 cu. in., which, Mr. Breese said, will safely control the heaviest legal loads. The action of the vacuum-suspended type is quicker; and a relay valve is provided for motorcoaches and trailers, in which the booster unit is remote from the control valve, which gives a quick application of the brakes by admitting air to the booster without passing through the brake valve.

Various combinations of brake valves can be made. One of them provides an independent hand control for the brakes of the trailer and the tractor, and another is a dash control which can be set to predetermine the amount of vacuum that is maintained in the trailer line in proportion to the load on the trailer.

Attention is directed to the fact that loads must be anchored to provide against shifting with the high rates of deceleration that are obtainable with heavy-duty power brakes.

Motion Pictures of Tank Truck and Trailer Shown

Before the meeting was opened to general discussion, J. F. Winchester, of the Standard Oil Co. of New Jersey, showed a motion picture of the operation of a large tank truck and four-wheel tank trailer, depicting the smooth control of the trailer under various operating conditions. An interesting feature was the drawbar connection and protective bumpers used between the truck and trailer to protect the gasoline tanks from damage that might result from broken drawbars. These bumpers were developed after a broken drawbar had punctured the tank on the truck and resulted in a bad fire from gasoline that flooded the road.

Discussers Debate Mechanical Features

In the general discussion, question was raised regarding the trend in location and drive of the air-compressor away from the front end of the engine crankshaft to one of the accessory drives, and whether the timing gears and couplings of the engine are suitable for the fluctuating load. The reply was that the tendency is toward multiple-cylinder compressors which will smooth out these fluctuations and that compressors built into the engine have been tried but not yet perfected. The life of the compressor was said to be considerably shorter when it is placed in the airstream from the cooling fan.

One discusser pointed out that both the air brake and the vacuum brake are air brakes, one operating at high air pressures and the other at low. The power-applying cylinders or diaphragms in the air type are smaller and can be mounted more conveniently on the axles or brake flanges. The vacuum type has the safety feature that pressure on the pedal regularly used applies the brake, even in the event of failure of the power booster. It was noted that comparison of the two papers indicates that the range of practical application, action and degree of control of the air and vacuum systems are becoming increasingly similar. Ample valves and piping reduce the time lag in operation to virtually nothing, with the relay valve.

In answer to questions it was stated that very little oil passes into the air tank in the form of vapor. The life of the diaphragm is about one year, setting it in a vertical plane favoring long life. R. R. Stitt, of the Automotive Air Brake Corp., in describing air brakes operated by vacuum from the engine inlet manifold, stated that the air coming from the engine sump is warm and drives out moisture, thus preventing the brakes from freezing in cold weather.

Proportioning the Control of the Trailer

Electric control, because of its flexibility of adjustment and simplicity of connection, was cited as a possible solution for conditions that tend to make the trailer brakes drag, as when running empty with the light two-wheel trailers used for hauling telegraph poles. Balanced air or vacuum control in combination with hydraulic brakes was mentioned as a good solution of the problem of equipping old trailers with brakes.

So called "jack-knifing" of trailers with power brakes was said probably to be due to brakes having smaller diaphragms on the trailer than on the tractor, whereas they should be of a size at least to equalize the braking energy on the two vehicles.

Those who discussed the papers were J. F. Winchester, A. M. Wolf, R. P. Breese, S. Johnson, Jr., M. C. Horine, M. L. Pulcher, L. P. Kalb, T. C. Smith, A. J. Scaife, and R. R. Stitt.

Advance Made in Truck Rating

Committee Agrees on General Formula Requirements—Defers Final Action to October Meeting

A DEFINITE forward step was taken by members of the Motor-Truck and Motorcoach Rating Committee at a meeting at White Sulphur Springs on June 14, by first reaching a practical agreement as to the method of expressing motor-truck ability or performance and then setting up a definite suggestion as to a standard method for expressing capacities that will make possible the comparing of different trucks quickly in general terms that can easily be arrived at. The whole problem was considered primarily from the vehicle purchaser's point of view, but with intent to avoid recommending a method that would establish a fixed relation between load and chassis weights or that could be written into laws as definite limiting factors.

Since the meeting of the Committee in Detroit last January, at which a tentative method of expressing ratings by a three-term expression consisting of (*a*) gross vehicle (or train) weight, (*b*) the grade-ability factor and (*c*) maximum top or governed truck-speed, was discussed, a number of suggestions had been submitted by members of the Committee. These were discussed and it was decided that the best method to consider is one along lines suggested by T. C. Smith, expressing the ratio between chassis, without powerplant equipment, and gross weight. However, the point was made that a definite ratio is undesirable and would be too restrictive if written into law, because improved designs and the use of new and stronger materials would not be taken into account in the rating. After considerable discussion, the Committee finally agreed that the following three-term expression should be proposed as the method of rating, the first term being that of primary interest to the truck purchaser:

Proposed Terms for Rating Trucks

(1) Gross chassis capacity, to nearest 100 lb.
(2) Gross vehicle weight, to nearest 100 lb.
(3) Chassis weight, less powerplant, to nearest 100 lb.

It was also agreed that these terms should be defined in the recommendation, as to their interpretation and use in rating trucks, and the following supplementary information was approved:

(4) The first term of the rating is for the purpose of classification.
(5) The second term is the vehicle manufacturer's gross-vehicle-weight rating.
(6) The third term is pertinent information.

To avoid confusion as to just what part of the vehicle the first and second terms of the rating include, the following definitions also were approved:

(7) Gross chassis capacity includes the payload, body, cab, and body-equipment weights.
(8) The powerplant includes the engine, clutch, transmissions and engine accessories.

Grade-Ability Formula Supplementary

Discussion then turned to the grade-ability formula for expressing performance ability, approved at the meeting last January, and alternate methods suggested since then by members of the Committee. This formula is:

$$\text{Per Cent Grade} = 100\left(\frac{T \times 12 \times e \times R}{r \times GVW}\right) - RF$$

THEY COVERED THE MEETING

(Left to Right) Harold F. Blanchard, *Motor;* Morgan W. Gibney, *Popular Mechanics;* Leslie Peat, J. W. Cottrell and Norman Shidle, Chilton Class Journal Co.; W. C. Callahan, *Automotive Daily News;* E. Y. Watson, *Detroit News;* and President A. J. Scaife.

In this formula the factors are defined as follows:

e = efficiency from engine to tires = 0.90
GVW = gross vehicle weight in pounds
R = gear reduction (axle ratio when used for rating calculation but can be axle ratio times transmission ratio when figuring ability in other than direct gear)
r = rolling radius in inches of driving tires at rated capacity
RF = road rolling-resistance factor per pound of GVW = 1.5 lb. per 100 lb. for good road conditions
T = engine torque in pound-feet = cubic inches of displacement × 0.625

The opinion of those present was that the ability formula should be regarded as supplementary to the proposed standard method of rating, so that the performance of trucks could be indicated on a uniform basis. It was agreed, however, that the exact formula to be used is not so important as is the use of the same constants in whatever formula is applied. Accordingly, this phase of the subject was left for further study and agreement at the next meeting of the Committee, to be held at the Transportation Meeting in Toronto next October. However, the Committee plans to include formulas suggested by M. C. Horine, L. P. Kalb and other members in its recommendation as alternative methods of calculating truck ability.

The Committee voted that the action taken at the White Sulphur meeting is purely tentative and subject to approval by members of the Committee who were not present.

Members in attendance were Chairman L. R. Buckendale, B. B. Bachman, J. W. Cottrell, F. K. Glynn, M. C. Horine, President A. J. Scaife, Pierre Schon, T. C. Smith, J. W. Shields, John Walker, J. F. Winchester, A. M. Wolf and B. F. Wright.

Code Experts Agree on Limits

Dimensional Specifications and Weight Recommendations for Trucks Clarified

WHEN the Council of the Society voted at its meeting last January to accept the invitation to become a member of the Motor Vehicle Conference Committee, the S.A.E. Automotive Transport Code Committee was appointed to take the place of the Code Subcommittee of the Transportation and Maintenance and the Motorcoach and Motor-Truck Activity Committee and to centralize all code matters in the Society in the new Committee, of which F. K. Glynn was appointed Chairman.

The new Committee first sent a questionnaire to members of the Activity Committees to determine to what extent agreement could be had as to dimensional and weight limitations on motor-trucks. The large number of replies indicated very general agreement as to these limiting factors, and, accordingly, the Committee met at White Sulphur Springs on June 16 to consider definite recommendations to serve as the basis for a uniform Code in all States of the Union.

Width, Height and Length Limits

Lack of uniformity in the method of measuring vehicle width over tires under the regulations in various States was one of the important points to be clarified, and the Committee members present gave serious consideration to a recommendation as to the method of measuring the width and the condition of the tires, with respect to bulging and the like, that should be specified. Dimensional limitations on width also were discussed.

Replies as to a recommended limitation on maximum vehicle height varied considerably, depending to some extent upon the section of the Country from which the replies came. The Committee felt, however, that a definite height limitation could be agreed upon without much difficulty, the limit to be applied uniformly except possibly for special instances of vehicle operation that would have to be met by the individual operator.

Regulations with regard to length permitted for individual vehicles and combinations of vehicles were a more difficult problem. As the first step, the Committee classified and defined the types of single unit as follows: (*a*) truck, (*b*) tractor-truck, (*c*) semi-trailer and (*d*) trailer.

The Committee then considered tentative recommendations as to allowable lengths for single-unit vehicles, trains or combinations, and also as to what limitations should be placed on the number of units in a train. An important phase of the latter, which was discussed, was the most desirable way of providing for operation of special equipment such as that of public utilities in hauling poles, structural steel and similar loads under more or less periodic conditions. This discussion involved

FIVE HIGH-POWERED CHAIRMEN

F. K. Glynn, Automotive Transport Code; Arthur Boor, Standards; N. G. Shidle, Meetings; B. B. Bachman, Military Motor Transport; and L. R. Buckendale, Motor-Truck Rating

also the consideration of regulations applying to overhanging loads, such as ladders, lumber or pipes extending beyond the rear of the vehicle, but it was agreed that this is more a matter of police regulation under local ordinance than of regulation by a State code.

Weight Limits a Difficult Problem

Regulation of permissible weights on the roads, in various States and on various classes of road, was considered one of the more difficult and important problems to be solved; and, in view of the findings of the Bureau of Public Roads concerning the effect of weight concentrations on highways, those present agreed that minimum-maximum axle-weight limitations should be recommended for solid, high-pressure and balloon tires on roads, highways and streets, in lieu of limitations in terms of gross axle or wheel weights and inch width of tire contact on the road.

When the entire Code Committee has considered these regulation recommendations further and come to agreement as to what valuations should be specified, a definite report will be submitted to the Motor Vehicle Conference Committee for further consideration by all National organizations concerned with State regulation of motor-vehicles.

Automotive Diesel Ideas Conflict

Dutch Engineers Present Advanced Diesel Facts—Design Data and Fuel Requirements Outlined

EMINENT engineers still differ regarding fundamental economic factors of the automotive Diesel question. At least, conflicting facts and ideas were presented at the Diesel-Engine Session held June 16 after three excellent papers had been introduced by Chairman C. C. Hinkley, of the Buda Co. T. B. Rendel, of the Shell Petroleum Co., brought to light an array of valuable information from Holland when he read the paper on Ignition Quality of Diesel Fuels as Governed by Thermal Stability, a contribution from G. D. Boerlage and J. J. Broeze, of Bataafsche Petroleum Co., of Delft. The paper is published in this issue of the S.A.E. JOURNAL, beginning on p. 283. Elizabeth W. Aldrich, of the Bureau of Standards, specialized on Vapor Pressures of Automotive Diesel Fuels in her paper, whereas R. P. Ramsey, of the Buda Co., brought out interesting details regarding Design Factors and Combustion Control as they influence the automotive Diesel's future.

Calculations Not a Substitute for Tests

In discussing the Boerlage-Broeze paper, A. L. Beall stated his belief that calculations of ignition temperatures cannot constitute a substitute for engine tests. He advocates standardization of the C.F.R. Diesel unit for cetene ($C_{16}H_{32}$) number tests. Mr. Boerlage remarked that he has tried to correlate the C.F.R. and his Diesel tests. He believes that further work has good prospect of enabling correlation. Chairman Hinkley mentioned that the C.F.R. Diesel tests have not been carried to a point comparable with other standardized tests.

A. L. Clayden asked whether experiments were made to determine the effect of adding small quantities of other substances to change the ignition characteristics. He remarked that recent German work showed that the ignition temperature of benzol was greatly lowered by the addition of oil of turpentine. To his question as to how much ethyl nitrite would have to be added to change a fuel of 50 cetene number to one of 70 cetene number, Mr. Boerlage replied that the quantity varies with the fuel but would be about 2 per cent.

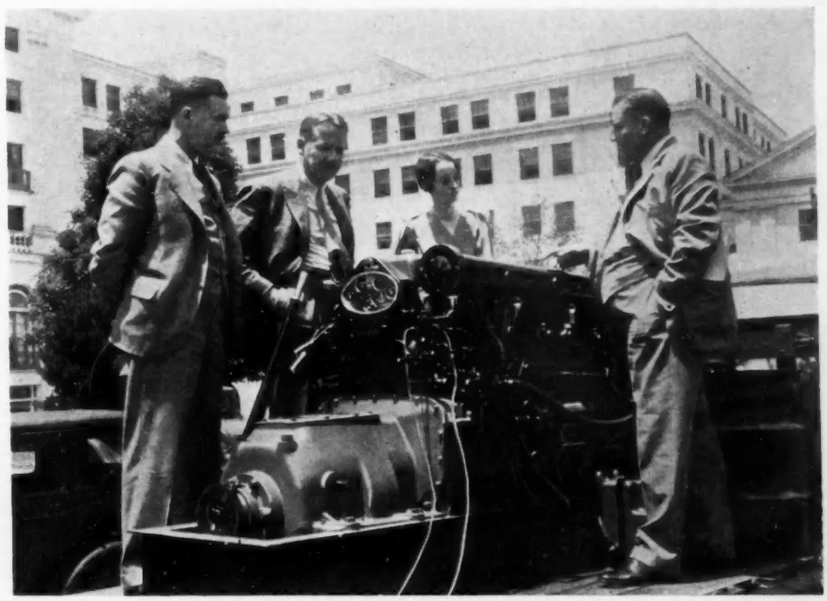
Vapor Pressures Analyzed

Miss Aldrich, after presenting data on the vapor pressure of Diesel-type fuels, pointed out that this information would be useful if automotive Diesel engines should come into use, as it would indicate the maximum allowable fuel temperatures. Tests were made on gas-free samples, she said, and the relations found were analogous to those for gasoline.

Influence of Combustion Control

In his paper on the influence of combustion control, Mr. Ramsey stated that Diesel engines can compete with gasoline engines better in the 800 than in the 400-cu-in. class, because production has not been great enough in the larger sizes to make the cost of such gasoline engines low. When well established in this field, the Diesel can invade the field of keener competition.

Observations based on five years' service of Buda-M.A.N. engines were reported by Mr. Ramsey. Bearings, valves and other parts are subject to no more trouble than in gasoline engines, he said. Injection systems have caused little trouble if clear fuel free from water was used, and most



"YOU SEE, IT'S LIKE THIS"

C. C. Hinkley, Chairman of Diesel-Engine Session, Explains the Buda Diesel to R. P. Ramsey, G. D. Boerlage and Elizabeth Aldrich, Who Spoke on Diesel Problems

of the difficulties that did occur were in the line between the pump and the open nozzle that was formerly used and in the small nozzle openings. The check-valve required with the open nozzle was hard to maintain.

Solution of combustion problems has been found, Mr. Ramsey believes, in an afterchamber design in which air is stored during compression, to be released during combustion. This results in slow burning and a maximum pressure little higher than that of a gasoline engine, which he asserts to be essential if the structure of a Diesel is not to be much heavier than that of a gasoline engine of the same power. This design is said to produce a flexible engine with clear exhaust.

Competitive Value of Diesel Engines

Chairman Hinkley remarked in the discussion that, from the paper, production of Diesel engines which can compete with automotive engines in first cost and excel them in cost of operation seems to be possible. Replying to a question as to how cold starting can be accomplished, Mr. Ramsey said he believes this can be done by arranging a valve to cut off part of the clearance volume during starting.

A. L. Clayden asked what prospect there is of economy in upkeep, to which Mr. Ramsey replied that his company's injection apparatus is believed to be practically foolproof and requires only infrequent adjustment. Further, he said that the valves give very little trouble. As to what the relative efficiencies of Diesel and of Otto-cycle engines are, a question asked by J. P. Stewart, Mr. Ramsey stated that the Diesel is about 30 per cent better at full throttle and twice as good at part throttle. The specific fuel consumpion is about 0.4 to 0.5 lb. per hp-hr., he said. W. E. Lee stated that this does not agree with his company's experience; despite a one-quarter cost for fuel and a one-half cost for lubricating oil, a fleet of trucks under observation showed Diesel-powered units to cost 46 cents agaist 28 cents for Otto-cycle-engine jobs, because maintenance costs were four times as high for the Diesels. This was due largely to valve trouble.

One point in connection with railway automotive units, remarked by G. A. Round, is that Diesel engines in the larger sizes are not available in low weights. Real possibilities exist for such designs.

Society Assisting Q. M. Corps

Military Motor-Transport Advisory Committee Studies Interchangeability Features of Mechanized Equipment

At the time of the Transportation Meeting of the Society in the City of Washington in October, 1931, a general conference was held at the office of the Quartermaster General and plans of the department for the standardized motorization of United States Army transport equipment were explained and cooperation of industry in the plans discussed. The Council of the Society subsequently appointed its Military Motor-Transport Advisory Committee, with B. B. Bachman as Chairman, to serve the Quartermaster Corps in much the same way as the Army Ordnance Advisory Committee has served the Ordnance Department.

At the meeting of the Committee in Detroit on Jan. 28, 1932, plans were perfected for cooperation whereby several groups were appointed to study the units coming within their classification, as planned for by the Quartermaster Corps.

Although economic conditions have made appreciable progress by some of the groups very difficult, considerable has been done by some of them. As Chairman Bachman felt that this important program should be pressed forward as much as possible, a meeting of the Committee was held at White Sulphur Springs on June 15 to review what each group had accomplished and determine what remains to be done to complete the Society's part in the Q.M.C. program.

Group Progress Reported

It was reported that all groups had made some progress but that in some cases not much could be done until the groups representing the several constructional units had brought their reports together for consideration as a whole.

Col. Brainerd Taylor, who provides the contact for the Committee at the Quartermaster General's office in the City of Washington, reviewed the development of the Corps plans, their present and future status as determined largely by available appropriations by Congress and the general plans of the Army, and touched on the need for completing these plans for the procurement of Army vehicles from industry within a definite time because of the exhaustion by that time of the Army's transport equipment that is now available.

It was decided that each group would complete its study for submission to the members of the general Advisory Committee in time for them to prepare recommendations at the next meeting of the Committee during the Society's Transportation Meeting at Toronto in October, 1932.

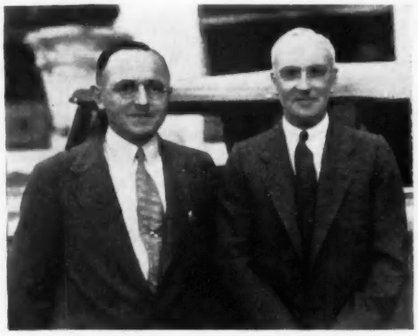
Body Experts Philosophize

"Adolescent Hands" Will Rule, Says Spring—Mistakes Called "Engineering Changes" by Frailich

An unusual session on bodies was addressed by F. S. Spring, of the Hudson Motor Car Co., who traced the aspects of public acceptance of automobiles from 1898 up to the present era, then projected his prophecy into a future when youth will be the determining factor in automobile modes. Chairman E. S. Marks, of the H. H. Franklin Mfg. Co., read the paper on Body-Die Development in the absence of its author, F. L. Frailich, of the Briggs Mfg. Co.

Where Do We Go from Here? was the title chosen by Mr. Spring for his paper, in which he reported some of the ideas of youth, gleaned from a large number of letters. In their cars the young people want high performance, greater flexibility, fewer control operations and extreme cleanliness of lines. They are even dreaming of cars with wings, that can take to the air at the will of the operator. As these youths are the buyers of tomorrow, said Mr. Spring, we must adapt ourselves to their views; we must have constant but not too radical change, lest we stagnate and die.

The industry should set its course for normal times; not merely to ride the crest of the wave. While this might involve turning away some or-



WHEN WILL AUTOS FLY?

F. S. Spring (Right), Speaker at Body Session, Propounds a Hard One for E. S. Marks, Session Chairman, To Answer

ders in boom times, it would mean an even keel and a more serene mind in less flamboyant times. We should not change policy for every shift in the winds of demand.

Die Maker Translates Artist's Lines

Mr. Frailich's paper brought the audience back to the concrete present when the problems involved in translating into steel the ideas of the body art department were presented. The engineering department transforms the artist's lines into a manufacturing draft showing the details of construction and assembly for, say, 125 parts. To make them, the die builder must design probably 550 dies, ranging in weight from a few pounds to perhaps 30 tons. Mr. Frailich advocates experimental die work and cooperation in design between the body engineer and the die builder.

Sympathy for Body Men

In the discussion of the Frailich paper, Chairman Marks observed that the body man is not the only one who makes a plea for more time to complete his job. "We never would finish a job," he said, "if we were to have all the time we want." He felt that the body man who complains at not having enough money to spend should expect to "sell" his needs to his executives.

Past-President T. J. Litle, Jr., marvelled at the nonchalance with which some body men will ignore the importance of exact dimensions. He didn't know whether this idiosyncrasy was a hangover from wheelbarrow days, but suggested that a dimension of 1 17/32 in. would be observed much more closely than one of 2 in. even. Mr. Litle expressed sympathy for the body men who must design their product in such a manner that this year's model can easily be changed to show the dashing new lines of the coming season.

Mr. Spring called for a simplification of dies to lower the costs. A. M. Wolf cited an example of the good practice of one manufacturer who uses the same dies for six or eight models.

T. C. Smith discussed the Spring paper by inquiring why bodies are not more quiet. "The dealer," he said, "has trouble keeping bodies quiet until he can sell them; then it becomes the customer's job."

M. C. Horine opined that we shall soon enter an era of blind driving by instruments alone, as in aviation, if seats are lowered and cowls raised much more. Mr. Spring did not approve of a lot of instruments. His company conducted tests on 25 experienced drivers to prove that the ammeter is not observed. Automatic charging of the battery was eliminated secretly and all 25 drivers ran their cars until the batteries were discharged, not a single driver having observed the danger signals of his ammeter.

Safe Air Transport Pays

Pan American Executive Tells Secrets of Successful International Operation

WHEN he introduced V. E. Chenea, general traffic manager for the Pan American Airways System, President Scaife, acting as Chairman of the Summer Meeting Aircraft Session, commented upon the importance of American international air communication as a great commercial asset to this Country. He referred specifically to the avoidance of what he politely termed "filtration," a merchandising phenomenon that can take place as trade information passes through a competing intermediary. A. E. Curtiss accompanied Mr. Chenea and acted as his spokesman in presenting a wealth of interesting engineering facts regarding Pan American operations. Several reels of travel pictures were then shown.

Amazing Five-Year Development

Swift development of air transportation in the brief period of five years since the pioneering transoceanic flights of Lindbergh, Chamberlin, Byrd, Post and Gatty and the good-will flight of the Army flyers around the South American Continent was emphasized by Mr. Chenea.

The color and drama of the spectacular and adventurous have been subdued in the establishment of great commercial airlines because of the enforced attitude of mind of the operator, with whom safety and reliability are first considerations. But the highly coordinated system of 22,000 miles of airways in the United States is linked directly with 32 countries and colonies, all but 2 in the Western Hemisphere, and weeks of travel have been cut to days.

In 17 days of flying time, said Mr. Chenea, he had made a trip, from which he had just returned, that, with the most perfect schedules for surface travel, would have required more than 1½ years, getting a bird's-eye view of 20 countries and visiting half a hundred cities.

Turning to the field of international airways, the establishment of these without governmental assistance was contrasted with that of domestic airlines, with an investment of about $48,000,000 in construction of airways for mail routes by the Federal Government. Besides developing nearly all of his own airports, seaplane bases and intermediate fields, the international operator must work out his own communication system and weather-reporting service, and in addition must function through different customs, immigration and shipping regulations in the numerous countries.

HE MADE A SAFE AIRLINE PROFITABLE

V. E. Chenea, General Traffic Manager, Pan-American Airways System, Inc., Distinguished Author of Air Operation Paper

Amazing progress, under the conditions, has been made in the last four years.

Details were given of the radio communication, the measures taken to report hurricanes so that the planes can avoid them, the twin-motor and the tri-motor aircraft and their crews, the maintenance shops and equipment, inspection and other safety measures that have resulted in a record of dependability of 99.81 per cent of scheduled trips in the last year.

Ring Progress and Frames Featured

Piston-Ring Eccentricities, Habits and Test Methods Considered —Frame-Stability Research Reported

MANY persons who heard H. M. Bramberry present a paper on Piston-Ring Progress, prepared by him in cooperation with Ralph R. Teetor, of the Perfect Circle Co., were surprised to learn the extent to which refinements have been carried in connection with the design, manufacture and inspection of piston-rings. Following the able presentation by Mr. Bramberry, Chairman H. T. Woolson introduced Clyde R. Paton, Packard chief engineer, whose detailed report on the problems of front-end stability included an explanation of the phenomena of front-end instability and an account of test methods that have led to satisfactory solutions.

As engine speeds and compression ratios have increased steadily in the last several years, the characteristics of piston-ring equipment to meet such demands have required very different rings from the equipment used in the lower-speed low-compression engine. An almost endless amount of effort and research has been required, together with the development of gage apparatus by which the minute dimensions and characteristics of piston-rings could be determined. This work has been in progress for several years, particularly in the last two years, the authors stated.

A "roller gage" and a "radial-pressure scale" were described, and their application in determining correct piston-ring shape was illustrated. Engine performance as affected by incorrect piston-ring shape was discussed, as well as the length of life of oil-control rings and compression rings.

Other subjects treated by Mr. Bramberry included the plotting of radial pressure on piston-rings, the effect of piston-rings on engine performance as determined in service in the field, and the effect of cylinder finish on piston-ring life.

After reviewing earlier investigations of automobile front-end instability and attempts to remedy it, Mr. Paton described in detail chassis-dynamometer and road tests with various frame constructions and showed that the problem is not necessarily one of frame stiffness. The study also showed that shimmy and front-end disturbance are a torsional vibration of the frame and body structure and that frame and body should be treated as a unit structure. Remedies that were found to be effective, said Mr. Paton, were addition of weight at the front, including spare wheels and tires mounted in front-fender wells; securing the radiator more rigidly to the dash and side rails; bracing the fenders and head-lamps; placing spring-mounted weights in the ends of the front bumper; bolting the body more rigidly to the frame; bracing the roof diagonally and reinforcing the cowl and side panels. Open and convertible cars call for different treatment than is most effective with sedans, which are stiffer in the mid-section. Unsprung weight well out from the center of the axles causes road shocks to be absorbed in the tires, and the speaker thinks that we may have gone too far in reducing unsprung weight.

Wheat and Tea Offer Comments

In carefully prepared discussion, presented by George L. McCain, favorable comments were made by T. E. M. Wheat and C. A. Tea, also of the Chrysler Corp., on Mr. Paton's work, which they said had shown results closely paralleling the data obtained at the Chrysler Laboratories. Description of a frame-fatigue test to destruction was an interesting feature of the Wheat discussion, whereas Mr. Tea emphasized the conflicting requirements of tire pressure and unsprung weight from the viewpoints of body shake and car readability.

Past-President J. H. Hunt and R. W. Brown elaborated on these points, Mr. Brown pointing out the fact that tires fail from dynamic, not static, load and that the service life of the tires is decreased when the unsprung weight is increased. Mr. Hunt stated that there may be a need for larger tires and heavier unsprung weights so that the disturbing shocks can be kept from the frame.

WHAT MAKES IT GO

As Told to H. M. Bramberry and C. R. Paton, Speakers at the Engine and Frame Session, by Their Chairman, H. T. Woolson.

New Brake Practices Studied

Free-Wheeling Evolution Traced—Drum Metallurgy and Brake-Lining Problems Aired

A. M. WOLF'S scholarly review of the practical problems of free-wheeling development, published in full in this issue of THE JOURNAL, was presented by the author in the company of two well-informed engineers who revealed uptodate facts on the status of brake development for the benefit of the Wednesday morning audience at White Sulphur.

Brake-drum metallurgy, with special reference to the new types of drum, was ably handled by F. L. Main, of the Kelsey-Hayes Wheel Corp., whereas Dr. F. C. Stanley, of Raybestos-Manhattan, Inc., skilfully shouldered the brake-lining phase of a many-sided situation. Chris Bockius, who prepared the paper on Brake-Lining Problems, was unable to be present. W. S. James, of the Studebaker Corp., engineered the Chassis Session from the chair.

Roller-Clutch Difficulties Recounted

Mr. Wolf carried on the subject of free-wheeling from the point where it was left in the paper by D. G. Roos and W. S. James, printed in the S.A.E. JOURNAL for January, 1931, and he acknowledged his indebtedness for much of his information to Mr. Roos and other engineers who have taken leading parts in the development of free-wheeling.

Tables were given to show the free-wheeling equipment of American cars for 1931 and 1932. Detail experiences with the devices having three and four rollers in each pocket were recounted by the speaker, who followed the steps that led to the present designs of roller clutch having more pockets and only one roller per pocket. Many drawings were presented, showing the designs of cams and cages and the arrangement of parts and control mechanisms, including a cage recently adopted for Chrysler cars which does away with individual springs for the rollers. Formulas were given for determining the load on a roller, also the recommendations of experienced engineers as to allowable loads.

The spring-clutch-type unit also was described in its various applications, and formulas were given for computing its capacity. A British wedge-shoe design of large capacity was described.

Metallurgy of the parts and lubrication of free-wheeling transmissions also were treated.

Brake-Drum Materials Studied

In reporting on recent metallurgical developments in brake drums, Mr. Main described and illustrated laboratory equipment for testing brakes and presented micrographs showing the structure of various steels and centrifugally cast irons, to show the differences between satisfactory and unsatisfactory drums. Exceptionally good results were reported from carburized steel drums and excellent results from centrifugally cast iron linings in steel shells. Mr. Main reported that the steel has a slight advantage in coefficient of friction, but the advantage is not great if the quality of the iron is controlled to make the results uniform with cast iron.

Much of the discussion of Mr. Main's paper had to do with the various factors—continued heating, design, method of casting, analysis of material—and their effect on grain size and grain stability.

A. S. Van Halteren gave a brief recital of the changes in brake-drum design insofar as they relate to metallurgical considerations. He divided brake drums into four types: the pressed-steel drum, for years the standard drum and still used by a number of car manufacturers; the composite steel drum with brake rings of various grades of steel, being a drum type used commercially today; the full cast-iron drum, widely used on trucks and motorcoaches and to some extent on passenger automobiles; and the composite iron-and-steel drum, a recent development, exemplified by the "centrifuse" drum. Charts obtained from tests of various brake-drum materials were analyzed.

Grain Structure and Heat Dissipation

C. L. Eksergian, chief engineer of the Budd Wheel Co., referring to Mr. Main's statement that centrifugal casting tends to produce a finer grain structure than sand-casting would give, stated that the assumption that grain size is a function of internal pressure during cooling is not supported by reason or fact, as similar structures can be obtained by permanent-mold casting, and in sand-casting the coarser grain structure is attributable to the slower rate of cooling, but the same degree of refinement is readily obtainable by slightly varying the carbon-silicon ratio. The most conspicuous advantage of sand-casting, he said, lies in its easier controllability for obtaining commercial

A REMARKABLE FRUIT STORY

Austin M. Wolf, Author and Speaker, Extracting Juice from the Free-Wheeling "Pineapple" for W. S. James, (Left), Chairman; F. L. Main, Speaker on Brake-Drum Metallurgy; and F. C. Stanley (Right) Speaker on Brake-Lining Problems

consistency. Mr. Main admitted that this is true to a certain extent, but said that the centrifugally cast material on a steel backing has inherent advantages in this respect over sand-cast drums and is lighter.

Referring to Mr. Van Halteren's comments regarding the effect of mass in controlling temperature rise in the drum, Mr. Eksergian stated that mass is only one factor, others being conductivity, radiation and convection. If the design is such as to permit of raising the rate of dissipation, the increment temperature rise is relatively reduced and the mass can be reduced. The greater the mass is, the slower is the cooling recovery.

D. P. Forbes, president of the Gunite Foundries Co., said that in cast brake-drums the ideal structure is pearlitic or sorbitic. Any trace of free ferrite tends toward rapid wear or scoring. On the other hand, an excess of free cementite results in rapid wear of the linings, since the softer pearlite is worn away, leaving the hard cementite in relief to act as a cutting-tool. He believes that the graphite present in cast drums acts only slightly as a lubricant and that its chief function is to break up the continuity of the structure, which prevents metallic flow of the surface and the tendency toward scoring. A structure containing patches or areas of extremely fine graphite in a sort of lace-work design is to be avoided, since this usually contains quantities of free ferrite.

Alloys are of advantage, said Mr. Forbes, chiefly when they contribute to the strength of the metal, since wear resistance seems to be more dependent on strength than on hardness. If suitable material can be obtained by metallurgical control, alloys can be omitted.

A divergence of opinion developed among a number of speakers as to whether deterioration of cast-drum material is due to a breakdown of the combined carbon.

Lining Makers Have Research Job

Problems in research thrust upon brake-lining manufacturers through changes in brake-drum design and materials were outlined in the paper by Mr. Bockius, who briefly reviewed the change in general practice from low-carbon pressed-steel drums for both passenger-cars and commercial vehicles to high-grade cast-iron drums on heavy vehicles, the use of power or booster brakes, and now the composite low-carbon pressed-steel drum faced with cast iron or high-carbon steel. Other factors affecting the lining problem are increased car speed, higher unit brake pressures, free-wheeling and reduction in brake-drum diameter. The author mentioned the differences in frictional properties of cast iron and carbon steel, the latter requiring a relatively high percentage of organic material in the brake lining, whereas cast iron and alloys of iron have some degree of inherent lubrication that gives smoother brake performance and permits higher unit pressures.

Lining manufacturers must embark upon an entirely new line of research, according to Mr. Bockius, to determine what material is best suited for the iron-surfaced drum, as the requirements of the passenger-car are not strictly parallel to those of the commercial vehicle, and the character of the iron surface is not yet standardized. An excellent spirit of cooperation exists between the drum and lining manufacturers, however, and standards for properties of the drum surface are very likely to be agreed upon by the two branches of the industry. The molded or pulp type of lining is at present being used on cast-iron drums, but the use of woven or folded-compressed fabric is entirely feasible without the objections to its use with low-carbon pressed-steel drums. And it may be found that the metallic-fabric construction presents structural strength giving extreme durability.

Cause of "Fading" Discussed

Dr. Stanley said that "fading" in braking ability is less with the thin-section drums than with thick ones and less with short brake-shoes than with long ones, as the thinner sections allow distortion and shorter shoes give better heel and toe action under this distortion.

Mr. Van Halteren suggested the possibility of fading being greater with cast-iron drums, which do more work, with consequent increased temperatures. In the opinion of Mr. Forbes, the action of fading results more from linings than drums, although some evidence indicates that under some conditions steel drums are less subject to this action, possibly because of the small amount of work done in the steel drum during a quick stop. He suggested that possibly a lining could be developed that would have a rising coefficient of friction as higher temperatures are reached.

With reference to Mr. Bockius's remarks regarding smaller drums and increased lining pressures, Mr. Eksergian pointed out that torque ability is only one requisite for overall performance and said that a small brake with high pressure might easily fail the heat-dissipation.

Will Sales Upset Tire Balance?

Some Fear Indigestion from "Doughnuts"—Automobile Aerodynamics Now Practised Effectively

FREDERICK S. DUESENBERG did a particularly commendable job as Chairman of the Future Development Session, which attracted many to the Auditorium Thursday morning. Papers by B. J. Lemon, of the United States Rubber Co., and H. G. Winter, of the Briggs Mfg. Co., were presented, the first on the Super-Balloon Tire and the second on the Application of Aerodynamics to the Motor-Car.

The super-balloon tire was defined by Mr. Lemon, who read his own paper, as "a triple-oversize tire on a smaller-diameter wheel than present wheels," and he said that the three important factors influencing the sale of these tires are traction, riding appeal and attractive appearance. They contribute another step in tire evolution, but engineering correlation with other interrelated automobile parts that are equally important from the viewpoints of riding and appearance will be necessary. This presents no simple problem if doughnut tires are to be offered as original equipment. Slides of 1932-model cars equipped with tires of the new type were shown and tables were presented of present experimental tire sections, widths, heights, load capacities and wheel and tire weights.

Performance Characteristics of Super Tires

The speaker discussed at length the characteristics of super-balloon tires as regards effect on steering and riding comfort, traction and skidding, liability to puncture and

tread wear, relative danger produced by a blow-out, tire sound and the like. In conclusion, the advantages and disadvantages were weighed.

Among the statements made were that the automobile of today is more adaptable to doughnut tires than was the 1923 car to the balloon tires; that super-balloon tires will stimulate work on springs, shock-absorbers, unsprung weight, independently sprung wheels and front-end problems; that very likely they will become standard equipment on some light and medium-weight cars next year; that cars can be designed to perform as well on them as on present standard tires; that heavy cars may require power steering or a more efficient type of manually operated gear; that serious consequences may result to an inexperienced driver if a sudden blow-out occurs at a speed upward of 50 m.p.h.; and that the super-balloon should prove superior to the present tires in traction and freedom from skidding.

"DOES THE PRESSURE RISE?"
Councilor F. S. Duesenberg Trying To Push His Finger through One of B. J. Lemon's "Doughnuts" While H. G. Winter Crouches

DeSoto Experience on Shock-Absorbers

Written discussion by Tore Franzen, of the Chrysler Corp., read by T. C. Smith, recounted some of the experience with riding qualities in fitting the doughnut tires to the DeSoto car. Springs, he said, must have low periodicity and should work satisfactorily with or without lubrication. A body-motion chart was presented to show why it is desirable to change the characteristics of the shock-absorbers with the extra-large tires. Following a sudden release from a 4-in. "bump" with regular equipment, the body comes to rest after 1½ oscillations. With the same shock-absorber and 7½-in. tires, there is only one main swing of the body, which is followed by a jiggle that is particularly noticeable at low speed. This is killed by introducing static valves in the shock-absorber to keep the liquid passages closed until there is a certain pull on the arm.

Light-weight cars are needed to make the super tire practicable, according to William B. Stout, who said that the greatest trouble with the big tires is the kind of cars on which they must be put. Too much weight causes trouble in parking, and too low a center of gravity causes bad side thrust on the tire.

Extremely large tires are ridiculous, according to John C. Tuttle, of Goodyear. The 9-in. tire requires a pressure of 16 to 18 lb. per sq. in. for stability, and efficient use of rubber indicates the 7½-in. size, which is said to be just as good at that pressure. W. S. James, of Studebaker, stated that the pressure in a tire will increase from 21 to 29 lb. per sq. in. in a short drive at 45 to 50 m.p.h. He complained that the ideas of the advertising man and the cartoonist will throw out of proportion the whole car, which engineers have tried so long to balance. F. F. Chandler, of the Ross Gear & Tool Co., reported some trouble from lag in steering, over-steering and excessive righting action.

J. H. Hunt said that the proposed decrease in tire air pressure is 39 per cent, the same as that which caused so much trouble between 1923 and 1928. He called upon the tire manufacturers for data on the rates of tires of the various epochs, considered as springs, and also on the hysteresis loss for a deflection cycle, to aid engineers in estimating the effect of a change.

Aerodynamics for Earth-Bound Cars

Mr. Stout read Mr. Winter's paper for him, on account of an attack of illness that, however, did not prevent the latter from attending the session to participate in the discussion and answer questions. In his paper Mr. Winter contended and attempted to prove that a relatively efficient aerodynamic form may be found for automobiles without digressing entirely from the shape and contour of present cars, and moreover that this can be accomplished without resulting in uniformity of design. Neglecting induced drag, he classified drag as skin friction and turbulent drag. Consideration of turbulent drag directs attention at once to the rear of the car.

Comparing the automobile and the airplane, the author pointed out that the latter "creates its own tornado" and the air passes over each part always in the same direction, whereas with the automobile the wind direction is not constant; therefore the earth-bound design needs to be a compromise so that the drag will be low when the wind direction is not parallel to the motion. By plotting a speed of 80 m.p.h. and cross winds of various intensities at various angles, symmetrical shapes were shown to be superior to the blunt-nose type. With the latter, said Mr. Winter, we cannot afford to have even a molding around the front, and its omission would handicap the designer.

Wind-tunnel test models that had a symmetrical shape in the forward two-thirds portion, smooth surfaces, generous radii throughout and a reduction of turbulent-flow sources were made, after a preliminary study,

without changing the chassis, seating arrangement and head-room. The models incorporated a so-called "inverted-V" windshield that equalled a flat windshield placed at 45 deg. Changing the entire front ends resulted in a 17-per-cent reduction in wind resistance. Of various types of windshield, the elliptical showed the best factor. Every effort should be made, according to the author, to have fillets as large as possible wherever there is a change in direction of contour, sharp corners being eliminated.

It is believed that this study will result in many new design features which, when used in correct relationship with the others, will result in low drag, and that, instead of all cars looking alike, a great divergence of design can be secured.

Roadside Lighting Needed

Headlighting Research Suggests Further Study of Stationary Highway Illumination

DR. H. C. DICKINSON opened the Headlight Session with a detailed explanation and illustration of What Can Be Seen with Headlights, his paper having been prepared in collaboration with H. H. Allen, also of the Bureau of Standards, who had conducted the experimental work upon which the findings of the report were based. Assisted by W. M. Johnson, of the General Electric Co., W. C. Brown, of the same company, demonstrated the Development of Fixed-Focus Headlighting Equipment, in connection with a paper prepared jointly by Mr. Brown and R. N. Falge, of the General Motors Corp. Past-President J. H. Hunt, of the General Motors Corp., presided.

The paper by Dr. Dickinson and Mr. Allen was a brief discussion of the research methods used and the results obtained in the investigation of headlighting which was conducted in 1927 and 1928 at the request of and with funds appropriated for the purpose by the National Automobile Chamber of Commerce. The tests consisted entirely of physical measurements of various kinds, made by a limited number of observers on different types of highway under various conditions, and when the results were analyzed, the conclusions drawn from them proved controversial in several respects. Publication of them has therefore been long delayed, except for one short paper published in *Transactions of the Illuminating Engineering Society* in January, 1929.

A Fault of Symmetrical Lighting

The most important of the general conclusions drawn from the results are that no practicable sort of symmetrical distribution of the headlamp beam will enable both approaching car drivers to distinguish objects to the rear of approaching lights for a distance much in excess of 100 ft.; that adequate light on the roadside is the most important element in avoiding danger when passing other cars; and that the most serious problem is the great disparity in brightness between different lamps, the beam intensities of which vary more than 10:1 even in fairly normal equipment. One of the most pressing practical problems, according to the authors, is a study of the effect of stationary artificial highway lighting on safe visibility.

Dr. Dickinson showed a film which illustrated graphically the effect of curves, grades and road irregularities on the field of view under night driving conditions.

Principles of Fixed-Focus Lamps

Mr. Brown gave an explanation of the principles of the fixed-focus headlamps that are now being installed on virtually all new cars. Successful elimination of the focusing adjustment that formerly gave the most trouble in head-lamp adjustment has been accomplished through a combination of accurate parts and assemblies, reflectors having a somewhat longer focal length, and an insensitive optical design. By building various parts of the beam from rays emanating from correctly chosen zones in the reflector, a beam pattern is developed that is relatively insensitive to small variations in position of the filament. The speaker showed with slides how these parts of the reflector are chosen to concentrate the rays in an intense beam or "hot spot" and other areas are selected to form the remainder of the upper beam, and how the beam is affected by displacement of the filament in any direction away from the "at-focus" position. Diagrams of composite upper beams and lower beams were displayed. More than three overlapping bands of light are needed to ensure freedom from streaks and shadows caused by variation in filament positioning, so, to increase the number of bands, certain areas of the reflector are divided into narrower horizontal zones to redirect to best advantage the light they receive. Figures of an optical design that compensates for substantial inac-

FOCUSING ATTENTION ON HEAD-LAMPS

(Left to Right) Dr. H. C. Dickinson, Speaker, and H. H. Allen, Co-Author with Him; Past-President J. H. Hunt, Chairman; and W. C. Brown, Speaker

curacies of filament placement in dual-beam head-lamps were also shown.

Building the Beams

A battery of five head-lamps and a projection lantern, all trained on the screen, were manipulated by Mr. Johnson as Mr. Brown described the development of the new headlighting equipment. The way in which the upper and lower beams are built up was illustrated by considering the parabolic reflector subdivided into three major zones. Composite beam patterns were formed on the screen, using a separate head-lamp to produce each component, and the relative insensitivity of the typical American fixed-focus dual-beam head-lamp design to commercial variations in filament positioning was illustrated. The symmetrical beam patterns produced by several approved types of equipment, as well as asymmetrical distributions designed to give maximum visibility with minimum glare, were shown.

Black Light Demonstrated

In discussion, R. E. Carlson showed photographs illustrating road illumination and glare for symmetrical and non-symmetrical light patterns as well as data on the effect of so-called "non-glare" bulbs. The latter, which are partly silvered, are found to give less light, with no material changes in distribution. He also demonstrated the use of so-called "black light," that is, light with most of the visible radiation filtered out, for instrument-board illumination and suggested its value for automobile as well as aircraft use.

Mr. Brown agreed with Dr. Dickinson that many types of fixed highway illumination do more harm than good but pointed out that adequate lighting can be provided at a cost of about $1,200 per mile per year. Such an installation might be justified by accident reduction on certain intercity highways carrying dense traffic.

Chairman Hunt referred to his former connection with headlighting work and stated that his experience, based on about 10,000 miles of night driving between Detroit and Dayton, confirmed many of the conclusions reached by Dr. Dickinson. He suggested, however, that headlighting problems may depend somewhat on local conditions in different sections of the Country.

[1] See THE JOURNAL, January, 1927, p. 3.

Latest Research on Fuels and Lubricants

Closing Session Replete with Valuable Authoritative Test-Data Analyses and Conclusions

A GOODLY number of members interested in fuels and lubricants research remained for the closing session of the meeting, held June 17. Three contributions from the Bureau of Standards were presented. Arman E. Becker, of the Standard Oil Development Co., New York City, presided.

Analysis of Thin-Film Lubrication

Frictional Characteristics of Journal Bearings in the Region of Thin-Film Lubrication were analyzed by S. A. McKee and T. R. McKee in their paper. In the last decade, they stated, the development trend in automotive practice has been toward the use of higher speeds and higher pressures, necessitating a greater rate of bearing-heat dissipation and causing a greater possibility for oil-film breakdown. Realizing the importance of whether the criterion for bearing design should be based strictly on concepts derived from characteristics typical of fluid-film operation, the Bureau of Standards' study of bearing friction was extended to include this investigation of the effects of systematic changes in the various factors of operation upon the friction of the bearing when conditions are such that a complete film of the lubricant is not maintained between the rubbing surfaces.

The authors outlined their method for the study of bearing friction, described the friction machine[1] and its operation, and specified the journal and bearings tested, the lubricants used and the procedure in testing. The results were presented graphically and in tabular form. The conclusions reached were that, in the region of thin-film lubrication

(1) The coefficient of friction of a journal bearing is not a function of the generalized operating variable ZN/P alone but is also dependent upon the particular values of the individual operating variables.

(2) For a given bearing operating with a given lubricant, an increase in load or speed tends to decrease the value of ZN/P at the point of minimum friction.

(3) An increase in load with a proportional increase in speed to maintain a constant value of ZN/P tends to reduce the coefficient of friction of a given bearing operating with a given lubricant.

(4) The composition of the bearing metal has a marked effect upon the frictional characteristics of bearings, the point of minimum friction for a babbitt bearing occurring at a considerably lower value of ZN/P than that for a bronze bearing of similar proportions operating with the same lubricant and at the same load.

In the discussion J. P. Stewart and D. P. Barnard presented data confirming the Bureau's tests, although obtained in a different range of pressures and temperatures and with bearings of differing geometry. Loads up to 5000 lb. per sq. in. were employed. Different loads gave different coefficient-of-friction curves on the $[f-(ZN/P)]$ diagram rather than a single curve. The effect of differences in loading became less significant as the magnitude of the loading increased. Mr. Stewart reported the results of work which showed that bearing material has a large effect on the frictional drag, high-tin bearings giving a much lower coefficient of friction with a mineral oil than bronze bearings did.

If any generalized formula is to be of significance over a wide range of conditions, the pressure-viscosity coefficient of the lubricant, the compressibility of the bearing and shaft material and the oiliness of the lubricant must be taken into consideration, according to the discussers. O. C. Bridgeman contended that, under the "wedging" action of the oil-film, viscosity is more significant than "oiliness effect"; whereas, when no wedging occurs, viscosity does not enter and oiliness is all important.

Temperature Effect on Gum Determination

The paper on the Effect of Temperature on the Determination of Gum in Gasoline, by O. C. Bridgeman and J. C. Molitor, constituted the fourth progress report to the Society on the investigation of the problem of gum content. It was stated that plans are now being made for an extensive investigation of permissible gum contents, and that it had been found necessary to determine the primary variables from the fuel viewpoint which affect gum deposition in the manifold, and then evaluate their effect on the results obtained by a laboratory method simulating manifold conditions, this being

the procedure employed in the present investigation.

An outline of the experimental work was given. All of the data reported on gum contents were obtained by evaporation of gasolines from glass dishes, using an air jet. Air-oven temperature was found to have only a slight effect on the measured gum content, which was attributed to the fact that, owing to the low heat capacity of air and the high latent heat of evaporation of gasoline, the actual gasoline temperatures were about the same as the three oven temperatures. Accordingly, a second series of experiments was undertaken in which the gasolines were heated by liquids boiling at various temperatures, and the results were presented.

The recent investigation of gum contents has centered largely around a study of the three main variables involved: (*a*) time of evaporation, (*b*) temperature and (*c*) atmosphere surrounding the gasoline during evaporation; and it is believed that this work has made it possible to estimate the true gum content of a gasoline with moderate accuracy.

Humidity Effect on Engines

The paper on the Effect of Humidity on Engine Performance, by H. H. Allen and D. B. Brooks, was a comprehensive summary of the Bureau of Standards' work, excepting that portion previously reported[2], and covered a wide range of operating conditions with various types of equipment; notably, a 4-cylinder military truck engine, a 6-cylinder automobile engine, a 12-cylinder water-cooled aviation engine, and the single-cylinder C.F.R. engine. Test pressures, temperature and humidity were varied over wide ranges. Compression ratios from 2:1 to 10:1 were studied under various conditions of humidity, at constant temperature. The most important conclusions were

(1) The indicated horsepower of an engine decreases linearly with increase in pressure of water vapor (humidity).

(2) No relation exists between power and relative humidity.

(3) Engine power is directly proportional to the mass of oxygen in the entering charge.

(4) Humidity has little, if any, effect upon minimum specific fuel consumption; and what effect is shown is in the direction of increasing consumption with increasing humidity.

Research Reports Approved

Progress and Future Programs of Subcommittees on Five Projects Accepted by Research Committee

THE Research Committee met at luncheon on June 17 at White Sulphur Springs to hear reports from the various Subcommittees and to consider recommendations concerning the future programs on the research projects now under way. The reports and recommendations outlined below were accepted and approved by the Committee.

In addition to these Subcommittee reports, five technical reports were made by the Bureau of Standards covering: (*a*) vapor lock, (*b*) gum in gasoline, (*c*) vapor pressure of Diesel fuels, (*d*) research on alcohol fuels and (*e*) combustion processes.

Getting Road Data on Vapor Lock

The report on vapor lock, presented by O. C. Bridgeman, covers preliminary results obtained in an extensive series of road tests, recently undertaken at the Bureau of Standards, under the direction of the Cooperative Fuel-Research Steering Committee with the financial assistance of the Natural Gasoline Association of America.

In previous work, vapor-lock tests in laboratory fuel-feed systems indicated that the occurrence of vapor lock could be predicted with considerable accuracy from Reid vapor-pressure data. Surveys of fuel-line temperatures in a large number of automobiles and motorcoaches gave a basis for predicting the occurrence of vapor lock on the road and indicated a number of bad features in the design of fuel-feed systems. The present investigation is intended to cover the gap in this information with actual road-test data and to obtain a large-scale proof of the validity of the laboratory work and the temperature surveys.

Work on Gum and Vapor Pressure

On the subject of gum, Mr. Bridgeman referred to the paper, The Effect of Temperature on the Determination of Gum in Gasoline, prepared by him with the collaboration of J. C. Molitor and presented at the Research Session of the Summer Meeting. In this connection he reported additional data secured in a preliminary study of a possible method of predicting the gum stability of gasolines.

About a year ago the Cooperative Fuel-Research Steering Committee requested that the Bureau of Standards extend its vapor-pressure work to include automotive Diesel fuels while the vapor-pressure apparatus was still available. The data obtained to date were reported at the Diesel Engine Session by Miss E. W. Aldrich but, as preprints of the paper were not available for the meeting, a summary of the results was presented to the Research Committee.

At the last two meetings of the Cooperative Fuel-Research Steering Committee, the Bureau investigators had presented for the information of that group the results obtained in a study of the solubility of alcohol in gasolines. Mr. Bridgeman summarized briefly the results of that work to date merely for the information and interest of members of the Research Committee.

Cause of Detonation Still Uncertain

H. K. Cummings also brought to the Commitee's attention a paper which he presented at the recent meeting of the American Society of Mechanical Engineers in Buffalo entitled, Combustion Processes in Aircraft Engines, which deals chiefly with combustion as studied in actual engines. In it the work of various investigators is reviewed, and a bibliography of 34 references is appended to the paper. As a result of this review, the author contends that:

> In regard to detonation in aircraft engines, our present knowledge regarding combustion processes in engines has been made more definite since a report to the S.A.E. made five years ago and promising new lines of attack on the problem have been developed, but it still appears that we do not know exactly what detonation is nor precisely how antiknock dopes act.

Included with the reports of meetings of the Subcommittees which follow is an account of the meeting of the Joint S.A.E.-A.S.M.E. Diesel-Fuel Research Committee, which met in conjunction with the Oil and Gas Power Congress at Pennsylvania State College and which was attended by some of the S.A.E. members en route to the Summer Meeting at White Sulphur Springs.

[2] See S.A.E. JOURNAL, July, 1930, p. 56.

Lubricants-Research Results Reported

Twenty-five members and guests of the Lubricants Research Subcommittee met on June 15 at White Sulphur Springs to discuss the results obtained to date in the extreme-pressure lubricants investigation and to formulate plans for further work.

O. C. Bridgeman, who is in immediate charge of the test work at the Bureau of Standards, presented three reports for the Committee's information. The first, a Progress Report on the Investigation of Extreme-Pressure Lubricants, covered preliminary data obtained incidentally to the development of satisfactory methods for operating the Floyd and Timken lubricant-testing machines. At the time of the meeting no information had been obtained on the General Motors machines.

In this work the Subcommittee emphasized the necessity for considering the performance in service of the lubricants as the ultimate standard. Testing machines to indicate this service performance are being investigated; but, until performance of the lubricants in service is established, it is impossible to say whether a particular machine now available grades the lubricants in the correct order of merit.

The fact has been established that, by varying the test procedures with any of the machines available, the lubricants may be graded in different orders. The Subcommittee is securing and correlating service data and test-machine data and believes that test machines and test procedures will soon be developed to evaluate the various characteristics of extreme-pressure lubricants.

Upon recommendation of the Oils Group, the Subcommittee agreed to circulate to its entire membership, for a mail vote, the two following conclusions:

(1) There is no definite relation between whether or not a strip of copper is blackened by a lubricant and whether or not the lubricant will show extreme-pressure characteristics in service.

(2) There is no definite relation between whether or not a strip of copper is blackened by a lubricant and whether or not the lubricant will cause trouble due to corrosion in service on either steel gears or bronze gears.

Any member who disaffirms these statements will be requested to give definite supporting evidence for his contentions. All members of the Subcommittee were urged to undertake service tests on the lubricants that are being tested on the machines that have been installed at the Bureau of Standards.

YOU NEED TWO QUARTS OF MEDIUM

Bureau of Standards Research Experts, J. C. Molitor, S. A. McKee, O. C. Bridgeman and D. B. Brooks Receiving the Bad News from "Standard Oil" by Way of A. E. Becker, Research Session Chairman

Mr. Bridgeman referred to the paper entitled Frictional Characteristics of Journal Bearings in the Region of Thin-Film Lubrication, by S. A. McKee and T. R. McKee, presented at the Research Session, and summarized the results of tests which indicate that viscosity is an important consideration in the region of extreme thin-film lubrication even up to pressures as high as those encountered in gears under heavy load. He added that further work is under way to study other metal combinations and to investigate extreme-pressure lubricants.

In a Report on Viscosity Work, Mr. Bridgeman explained that the Bureau of Standards has begun an exhaustive investigation of viscosity and gave, for the Subcommittee's information, some preliminary data obtained in this study.

Antiknock Road-Test Recommendations

The road evaluation of fuels for antiknock should be made in the speed range of 15 to 20 m.p.h. and be based on knock intensity, according to the report of the Road-Test Procedure Sub-Subcommittee presented to and approved by the C.F.R. Detonation Subcommittee at its meeting at White Sulphur Springs on June 16. Further recommendations by the Sub-Subcommittee which were approved by the Committee at that meeting are:

(1) That the fuel under test be bracketed between blends of reference fuels, such as C5 and A2 (two of the reference fuels adopted for use in the detonation work). The actual work may be done by selecting the fuel that will just escape knock in the accepted speed range or by comparing actual intensities in this range.

(2) Either constant-speed runs in the accepted range or acceleration or deceleration through the speed range may be used.

(3) Standard adjustments should be maintained for the cars used but accurately graduated throttle openings may be employed to produce the intensity of knock desired.

These recommendations were based on the results obtained in a series of cooperative tests which were carefully analyzed and discussed by members of the Sub-Subcommittee at a series of meetings in the last few months.

Since the Sub-Subcommittee was originally charged with the choice of a suitable road-test procedure, the members of the group pointed out that their work might be considered as completed, all that remains within the scope of their group being to determine the average deviation of road tests by the suggested method from results obtained by the standard procedure on the C.F.R. engine.

A. L. Beall, Chairman of the Sub-Subcommittee, reporting for his group, said that it wished to be discharged and replaced by a larger, more representative subcommittee

made up of volunteers pledged to carry out the work assigned to it. He said that the group also recommended that such a volunteer subcommittee be charged with determining the deviation referred to in the report and with developing a procedure for the C.F.R. engine which will satisfactorily reflect the results secured by road tests conducted under the recommended practice.

Acting upon this suggestion, volunteer memberships on such a subcommittee were requested by the representatives of the Atlantic Refining Co., the Bureau of Standards, Chrysler Corp., Ethyl Gasoline Corp., General Motors Corp., Standard Oil Co. (Indiana), Standard Oil Co. of New York, Sun Oil Co., The Texas Co., Universal Oil Products Co., Vacuum Oil Co. and Yale University. It was agreed that additional automotive laboratories should be invited to participate.

A report was presented to the Detonation Subcommittee which, in the light of the information included, raised the question whether the Detonation Subcommittee, in working out a method of test, should endeavor to anticipate the behavior of cars that will be designed in the future or limit the application of the test method to cars at present in use. It was pointed out in the meeting that every reason exists for believing that the cars now in use were designed without any attempt to meet the conditions revealed recently in the course of the Subcommittee's road-test work and, therefore, it is reasonable to suppose that, in the light of this knowledge, engine design will be changed. However, the exact nature of the changes can be only a matter of conjecture, and therefore the suggestion was made that, if and when the cars are improved, the method can be varied to meet the changed conditions.

Diesel-Fuel-Research Program To Be Revised

The Joint S.A.E.-A.S.M.E. Diesel-Fuel Research Committee met at Pennsylvania State College on June 9, in conjunction with the annual Oil and Gas Power Congress. In the absence of Chairman Treiber, Lee Schneitter acted as temporary chairman.

Prof. P. H. Schweitzer, of the host college, briefly reviewed the research program originally adopted by the Committee at its organization meeting at White Sulphur Springs in 1931 and offered suggested revisions in the light of results obtained in various research investigations on the properties of Diesel fuels in the last year. Accordingly, the Committee unanimously voted to empower the presiding officer to appoint a program drafting committee to revise the outline of research, and Mr. Schneitter appointed the following to serve in that capacity: Professor Schweitzer, Chairman; W. H. Butler, Dr. H. C. Dickinson, Julius Kuttner, L. H. Morrison and M. J. Reed.

The Committee was in general agreement that ignition temperature, time lag and the relation between them are the phases of the problem demanding the most urgent attention and that, in order of importance, research on viscosity requirements and products of combustion should follow, while the problems of vapor and gas in fuel lines and vapor pressures of the fuels might well be deferred temporarily.

An interesting chart giving pertinent information concerning the methods for determining the ignitability of Diesel fuels was also presented by Professor Schweitzer and discussed at the meeting.

Culmination in Headlight Research

At a meeting on June 13 at White Sulphur Springs the Headlight Research Subcommittee formally approved, for presentation at the Headlight Session, a final report of the headlight research work conducted at the Bureau of Standards under the technical guidance of the Subcommittee and with funds provided by the National Automobile Chamber of Commerce.

This report is the last chapter in a long story of headlighting research, which was one of the first problems taken over by the Society's Research Committee upon its formation. As early as 1926 a research subcommittee was designated to cooperate with the Illuminating Engineering Society, through a Joint Steering Committee on Headlight Research in an effort to stimulate and guide experimental research directed toward the determination of the most satisfactory method of automobile headlighting and, in accordance with the results, to formulate a code of recommended practice with respect to headlamp equipment, adjustment and use.

The major portion of the Subcommittee's efforts was devoted to enlisting the cooperation of motor-car and lamp manufacturers in a fundamental study of light distribution. Many difficulties arose in coordinating the results of these diversified investigations and it was felt desirable to undertake a program of research in a centralized laboratory under the general direction of the Subcommittee. Accordingly, with funds provided by the N.A.C.C., work was initiated at the Bureau of Standards, and this investigation by road test, supplemented by laboratory experiment, was directed toward determining the optimum light distribution under various road conditions, at the same time protecting approaching drivers from glare. Progress reports have been rendered from time to time and a résumé of the entire project was included in the Summer Meeting paper, What Can Be Seen with Headlights, by Dr. H. C. Dickinson.

In the discussion of this report at the Headlight Subcommittee meeting, general agreement was reached that only a limited range of beam intensity should be permitted, with no absolute limits on the maximum intensity, and, further, that regulations should apply to all cars on the road and not exclusively to the new cars being produced.

Highway-Research Outlined

A plea for sound rational methods of regulating the use of highways, rather than arbitrary action by enforcement officers, was made by Dr. H. C. Dickinson, Chairman of the Highway Research Subcommittee, at the meeting of that group at luncheon on Monday, June 13.

Some months ago, as a result of the activity of the National Conference on Street and Highway Safety, the Bureau of Public Roads was assigned to undertake a research program on traffic, and the Research Committee of the Society was invited to offer suggestions concerning phases of the problem to be included. Accordingly, previously published traffic studies were reviewed by individual members of the Subcommittee and a series of informal meetings was held. At a meeting of the Subcommittee in New York City last April, a series of research problems were outlined under the general heading of Highway Utilization and were submitted to the Transportation Division of the Bureau of Public Roads as suggestions for future work.

These problems were discussed further at the White Sulphur Springs

meeting on Monday and the recommendation was made that the outline be submitted also directly to some of the State motor-vehicle administrators. The outline comprises three main divisions: (*a*) The Highway, (*b*) The Vehicle, and (*c*) The Driver; but the Subcommittee agreed that the third division, although important, is outside its field.

The Highway Research Subcommittee also considered the impact test work done by the Division of Tests of the Bureau of Public Roads in the last year, a report of which was approved for publication on May 2 by the Cooperative Committee on Impact. This work embraced tests involving (*a*) artificial obstructions and (*b*) typical surface roughnesses.

The Subcommittee recommended to the Research Committee that this work be commended and that assistance be offered to the Bureau of Public Roads in the development of instruments for the estimation of road roughness in connection with the problem of determining where and when repairs are economically justified.

BEING MEASURED FOR AN ACCIDENT

Research Chairman Being Tested for Reaction Time by R. W. Brown (at Right), Chairman of the Riding-Comfort Subcommittee. (Being Tested) Past-President B. B. Bachman, Research Committee Chairman. (Standing, Left to Right) Past-President H. W. Alden, Lubricants Subcommittee; B. J. Lemon, Front-Wheel-Alignment Subcommittee; and Dr. H. C. Dickinson, Highways Subcommittee

Front-Wheel-Alignment Recommendations

One standard of wheel-alignment settings for all cars is not possible or practicable at this time, in the opinion of members of the Front-Wheel Alignment Research Subcommittee who attended the meeting of that group on June 15 at the Summer Meeting. However, the Subcommittee felt it advisable to collect uptodate specifications on cars of 1932 model in an effort to determine how divergent are the specifications and tolerances on caster, toe-in, camber and steering-knuckle-pivot inclination.

Neither did the Subcommittee consider it practicable to recommend one method and one type or make of instrument for measuring alignment, but recommended that each car manufacturer establish his own procedure and that the Society, through publicity, endorse the procedures of the various car makers and emphasize that each procedure should be followed, insofar as facilities permit, by branches, dealers and service stations servicing the cars made by that particular manufacturer.

The Subcommittee further placed before the main Research Committee a recommendation that the Society approach the National Automobile Chamber of Commerce with a proposal to collect yearly wheel-alignment data, as well as all other specification data, and act as a clearing house for such information for distribution to trade journals. All inquiries for such data could then be directed to the N.A.C.C.

These questions were considered by the Subcommittee as a whole through correspondence, and the resolutions enacted at the meeting are based on the results of the mail canvass.

Riding-Comfort Program Discussed

In the absence of any progress report from Dr. F. A. Moss, who is planning to continue through the summer the testing of subjects with the wabblemeter, audiometer, visiometer and the recently developed reaction-time instrument, the Riding-Comfort group held a short informal meeting on June 15 at the Summer Meeting. The future program and its financing were discussed.

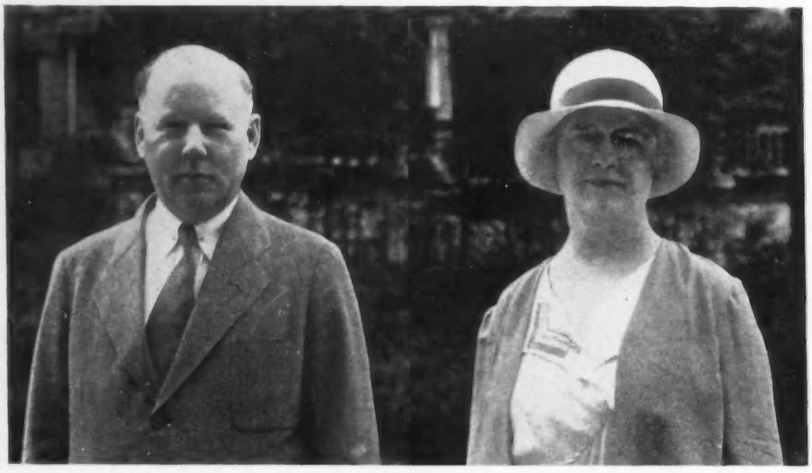
Scaife Urges Membership Action

Asks Lagging Members and Sections To Wake Up to Membership Opportunities

PRESIDENT SCAIFE certainly embraced the opportunity, afforded by the Semi-Annual Business Meeting, to emphasize the fact that the high professional standards of the Society are being held as high as ever during the present membership campaign. He mentioned this important fact by way of answering certain members who have had misgivings on this score. Continuing on the subject of membership, Mr. Scaife called for prompt and vigorous action on the part of every member to get a member. "Certain Sections," he said, "have succeeded admirably with a 'Let's Go' spirit, in getting new men of high caliber into active S.A.E. work, whereas a few others have said, 'It can't be done.'"

Society in Excellent Condition

It was gratifying for the members to hear their President state that the Society is in splendid condition generally. Consistently conservative policies of the Finance Committee and the elimination of unnecessary expenditures by the Council were credited for the Society's present good financial status. All hands agreed that it is remarkable to find the S.A.E. investment portfolio only 15 per cent "off."



PRESIDENT SCAIFE AND OUR "FIRST LADY"

Nominees To Be Announced Later

President Scaife reported that the slate of nominees for Society offices during 1933 will be announced later in the present administrative period. Several nominations for Activity offices still remain to be completed.

Before the Semi-Annual Business Meeting was adjourned, President Scaife very warmly commended the officers, committeemen, speakers, authors and session chairmen and expressed the Society's sincere appreciation for their successful efforts in bringing to pass a first-class Summer Meeting.

Thirteen Standards Reports Approved

Free-Wheeling Lubricants Classification Offered for Trial—Metric Conversion Factors for Bearings

THE first meeting of the Standards Committee in accordance with the new Regulations Governing the Committee was held on June 13, to pass on the 15 reports submitted by 7 Divisions. Thirteen of the reports were approved as follows:

The report of the Aircraft Division was a change from Recommended Practice to S.A.E. Standard of Aircraft Instrument Cases and Mountings. No change was made in the substance of the specification.

Bearing Conversion Factors

The Ball and Roller Bearings Disvision submitted six reports, four of which were approved. When the S.A.E. Standard for Ball Bearings was last reviewed and generally revised, conversion to millimeters from inches was based on the factor 25.4 rather than the more exact factor, 25.40005. World-wide agreement on 25.4 as the factor for industrial and commercial, but not for scientific or accurate, conversions is in process of accomplishment, and this report was submitted as an indication of agreement by the automotive industry upon this factor for ordinary use. It is understood that virtually all countries, including Great Britain, are in agreement, and concurrence of American national practice is expected very soon, through the American Standards Association, of which the Society is a member body.

For convenience, the factor 0.03937 for similar conversions to inches from millimeters was also approved for ordinary work. The largest diameter in the present standard for ball bearings is 580 mm., and this factor gives a difference of only 0.000045 in. compared with the accurate factor of 0.039370079.

The reports on Annular Single-Row Bearings, Separable or Open-Type Bearings and the Angular Contact-Type Bearings were submitted for approval of these bearings for American Standard under American Standards Association procedure. They have been S.A.E. Standard for several years.

The reports on Steering-Knuckle Thrust Bearings and Ball-Bearing Lock-Nut Washers were referred again to the Ball and Roller Bearings Division for further consideration, because of objections and differences of dimensions that were submitted just prior to the meeting of the Standards Committee.

Piston-Ring and Groove Dimensions

The gasoline Engine Division submitted two reports, the first on two sizes of Gasoline-Engine Mounting Pads that are now in common use. An intermediate size has been submitted since the Division completed its original report and will be referred to the Division for inclusion later. The other report is a standard of dimensions for Piston-Rings and Grooves for both cast-iron and aluminum pistons in diameters from 2 to 8 in. inclusive.

Free-Wheeling Lubricants Classification

The report of the Lubricants Division on a classification for Free-Wheeling Lubricants is the culmination of a year of earnest work by the automotive engineers and oil companies. The classification was approved for publication and trial as General Information for the remainder of this year, with the understanding that the Division will consider further whether to continue it as Recommended Practice in its present or some revised form before it is republished in the next issue of the S.A.E. HANDBOOK. The classification will be published in an early issue of the S.A.E. JOURNAL.

New Non-Ferrous-Metal Specifications

All of the standards for Non-Ferrous Metal Specifications now published in the S.A.E. HANDBOOK are being reviewed by the Non-Ferrous Metals Division for revisions and additions and coordination with corresponding specifications of the American Society for Testing Materials. The report as approved includes five new specifications, Nos. 204, 205, 207, 209 and 212, for Aluminum-Base Die-Casting Alloys, and two specifications, Nos. 903 and 921, for Zinc-Base Die-Casting Alloys. General information notes on the zinc-base alloys are included, and similar notes are being prepared for the aluminum-base alloys.

Parts and Fittings

The Parts and Fittings Division recommended revision of the present

(*Concluded on p. 36*)

Roos Urges Cooperation in Solving Highway-Safety Problems

Vice-President, S.A.E. Passenger-Car Engineering Activity

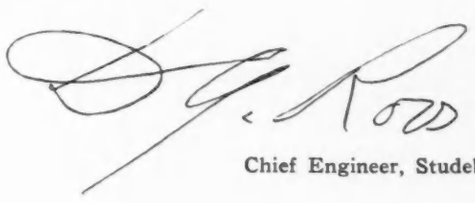
Fellow Members of the Society:

THE constantly growing density and speed of automobile traffic on our highways has been the subject of grave concern to our State Motor Vehicle Commissioners. So critical has the situation become to them that they now contemplate a closer scrutiny of motor-car design, particularly with reference to speed.

I am of the opinion that such a movement is inevitable and that the industry could not stop it even if it were believed to be desirable to do so. If this is so, it would appear that the cooperation of the automotive engineering fraternity with the Motor Vehicle Commissioners, in a whole-hearted way, would make it possible to handle any technical questions which may arise by a gentlemen's agreement and an informal code of procedure.

Such an attitude on the part of the automotive engineers will avoid the possibility of these questions becoming the subjects of legislation and, hence, restrictive and hampering in their effect on the progress of the industry and of motor-car design.

Fraternally Yours,



Chief Engineer, Studebaker Corp.

Chronicle and Comment

Quality Meeting at White Sulphur

IN STATING that the Semi-Annual Meeting was a "quality" meeting, many who made this observation referred not only to the excellence of the program, technically, but also to the truly representative gathering of engineering leaders of our industry. It was pleasant to have five Past-Presidents in attendance and actively interested in the meeting's success. H. W. Alden, B. B. Bachman, J. H. Hunt, T. J. Litle, Jr., and W. G. Wall were decidedly on deck.

In this, the Summer Meeting issue of the S.A.E. JOURNAL, a pictorial account of important events is given.

The August Aero Meeting

AUG. 30 and 31 again become one of the bright spots in the aeronautic firmament. Plans for the S.A.E. Aeronautic Meeting at the Hotel Statler in Cleveland during the National Air Races provide for the presentation of authoritative engineering papers on stress analysis, vibration, cylinder-head design, engine development and transport-plane problems.

The Cleveland Section will cooperate with the Society and the Aeronautical Chamber of Commerce of America in staging the Aircraft Dinner, held annually by these two organizations, on the evening of Aug. 31.

Program details will be announced in the August issue.

Transportation Meeting Plans Maturing

THE PROGRAM for the Transportation Meeting in Toronto on Oct. 4, 5 and 6 is rapidly being completed by the Transportation and Maintenance and the Motorcoach and Motor-Truck Activity Committees. Technical sessions will be held the three mornings of the meeting, in the evening of Oct. 5 and the afternoon of Oct. 6. The Transportation Dinner will be the evening of the first day and the Canadian Section will be the host, in charge of arrangements. The afternoons of Oct. 4 and 5 will be open for such recreation as those attending may choose, or for plant visits.

Did you Get Yours?

THE SATISFACTION derived from successfully introducing the Society to an engineer or executive and the man to the Society is unmatched. The partnership thus formed, beneficial alike to the new member and to the Society, adds to the strength and prosperity of the automotive industry.

Doubly gratifying are the number and type of men who daily are recognizing, with the help of some member, the place of the Society in the industry.

Have you secured a member yet? If not, look around, choose your man and help him to the best entrance to automotive progress—the S. A. E.

Standards Committee Regulations Revised

AT the Council Meeting at White Sulphur Springs on June 15, the revised Standards Committee Regulations prepared by the Standardization Policy Committee were approved and became effective. The major change from the old procedure is elimination of the general Standards Committee session at Annual and Semi-Annual Meetings, expediting decisions by both Divisions and the Standards Committee, and making it possible for the Standards Committee and Council finally to approve the adoption of reports at any time during the year. Only changes in the nature of correction of errors or editorial modifications are permitted under the new Regulations, thus requiring that reports be either adopted as recommended by the Divisions or modified by the Standards Committee with the approval of the Divisions submitting the reports.

The Standards Committee now consists of a Chairman and the Chairmen of the several Divisions, instead of all the members of the Divisions, as previously. The effectiveness of this new organization is already apparent. The reporting of Standards to a general business session of the Society has been discontinued, as it had become merely a routine step in the procedure and had no value in the formulating and adopting of standards. The new Regulations will be printed and distributed to the members of the Society at an early date.

S.A.E. Papers Widely Published

PAPERS presented at general and Section Meetings of the Society are being published in many technical and trade journals. Those papers for which space cannot be provided in the S.A.E. JOURNAL have for the last 12 months been offered to other periodicals, thus complying with Article C53 of the Constitution of the Society, reading

> The policy of the Society shall be to give the papers read before and reports adopted at its meetings wide circulation, with a view to making the work of the Society known, encouraging engineering progress, fulfilling the Society's object and extending the professional reputation of its members.

The results have been gratifying, as a great majority of the papers presented in the last 12 months that could not be printed in the S.A.E. JOURNAL under present conditions have been printed in other established periodicals.

So that members and others who desire to read these papers shall be informed where printed copies may be obtained, references to them are henceforth to be printed in the Notes and Reviews columns of THE JOURNAL, beginning with this issue.

This Issue Has Two Sections

IN accordance with the usual practice, this issue of the S.A.E. JOURNAL is made up of two Sections, Section 1 being the regular monthly issue for July and Section 2 the Index to Vol. 30 covering the issues from January to June, 1932, inclusive.

On account of the arrangement of the paging that has been used for the last six months, abbreviations are used in connection with references to the news section to indicate the month in which the item was published. Before using the Index, members should read the explanatory note that appears on p. 3.

Canadian Section Leads for Section Award

Five Members Tied for Life Membership Award at Present in Get-Your-Man Competition

THE Canadian Section stands well out in front in the race for the Section award in the Get-Your-Man membership contest. This news is undoubtedly as much a surprise to our Canadian members as it is to all the other Sections in view of the figures that have previously been published.

However, the fact has repeatedly been called to the attention of all concerned that the standing of the Sections heretofore published has been based on *applications received* expressed in *percentage of Sections' quotas*, and that the number of applications had absolutely no bearing on the awards, such figures being indicative only of the interest and activity in the campaign and the consequent results obtained by the various Sections.

Now the campaign has progressed far enough to make possible the giving of the actual standing of the Sections from the contest standpoint. The number of *new members* decides the issues. A "new member" is again defined for the information of all as one who has been elected and has qualified by paying his initiation fee and dues. The percentages of the applications to quotas are published solely to indicate the opportunities that each Section and individual member has of winning the awards, provided that all applicants are elected and qualify for membership. Not all applicants have as yet been elected, so no direct comparison between the tables here given can be made.

In the tables the names are given of those members of the Society who have secured the largest number of *applications*, the second largest, and so on; and also the names of the individuals in their relative places for the awards, based on *new members* as defined above.

The rules provide that no applications sent in postmarked after midnight, July 31, will be considered in the contest. It is apparent, of course, that announcement of the awards cannot be made until the last applicant has been elected and time allowed for the payment of his initiation fees and dues.

The August issue of THE JOURNAL will announce on this page the final date for the qualification of members elected and the date of the announcement of the winners of the awards. In the meantime, it is hoped that members and Sections alike will concentrate their every effort to the end that the remaining few weeks of this campaign shall see a great influx of new applications from the many men in the industry who should be members of the Society.

APPLICATIONS RECEIVED to June 23, 1932

From SECTIONS

(Expressed in Percentage of Quota)

1	Philadelphia	61.4
2	Northwest	58.3
3	Indiana	38.1
4	Canadian	39.3
5	Baltimore	30.2
6	Kansas City	26.2
7	Chicago (Tied)	25.0
7	Southern California (Tied)	25.0
8	Detroit	23.1
9	Metropolitan	20.2
10	Pittsburgh	16.3
11	Washington	13.0
12	New England	12.9
13	Syracuse	12.1
14	Wichita	11.8
15	Cleveland	10.1
16	St. Louis	9.7
17	Buffalo	9.2
18	Milwaukee	8.3
19	Dayton	8.1
20	Northern California	8.0
21	Oregon	0

From INDIVIDUALS

(Relative Standing Based on Number of Applications)

First Place

John F. Hardecker

Second Place

O. M. Thornton

Tied for Third Place

James B. Franks, Jr.
A. Gelpke
Reese Lloyd
C. C. Stewart

Tied for Fourth Place

R. N. DuBois
J. G. Holmstrom
L. R. Joslin
L. V. Newton
G. O. Pooley
L. M. Porter

HERE IS WHAT COUNTS!

NEW MEMBERS OBTAINED (Elected and Paid Up)

Section Standing

(Expressed in Percentage of Quota)

1	Canadian	20.7
2	Indiana	13.1
3	Pittsburgh	10.5
4	Southern California	10.0
5	Baltimore	8.5
6	Northwest	8.3
7	Detroit	8.1
8	Chicago	7.8
9	Philadelphia	7.7
10	Metropolitan	7.2
11	Buffalo	6.7
12	St. Louis	6.5
13	Kansas City	4.8
14	Syracuse	3.4
15	Washington	3.0
16	Cleveland	2.9
17	Dayton	2.7
18	Northern California	2.0
19	New England	0.8
20	Milwaukee	0
21	Wichita	0
22	Oregon	0

INDIVIDUAL STANDING (For Individual Awards)

Tied for Grand Award

R. R. Teetor
L. M. Porter
C. C. Mathis
L. R. Joslin
F. K. Glynn

Tied for Second Award

R. H. Combs
J. G. Holmstrom
R. N. Janeway
B. J. Lemon
L. V. Newton
G. O. Pooley

News of the Sections

Boat-Engine Papers Presented

Remarkable Results Claimed for Air Injection at "Met" Section Meeting

MARKING what Vice-Chairman William E. John, representing the new Marine Division of the Metropolitan Section, predicted in his opening remarks will in later years be recognized as a milestone in marine engineering, the new Division held its initial meeting with an attendance of 175 on May 24 at the Park Central Hotel, New York City. The dinner preceding the technical program was attended by 115. So interested was the audience in the three papers presented that discussion was prolonged for nearly an hour and the meeting did not adjourn until 11 p. m. The speakers in the early part of the program contended with difficulty against dance music in an adjoining ball room and noise of talking in the corridor.

Some interesting facts regarding the leading position of the metropolitan district in the motorboat field were given by Vice-Chairman John, who gave figures of the number of motorboats in metropolitan waters and in the entire Country and data on races.

MacCormack Surveys Fuelizer Status

Methods of preparing the fuel-air mixture for the most effective combustion without detonation were reviewed in the paper given by J. C. MacCormack, vice-president of Godward Gas Generator, Inc., who mentioned researches made and engines built in the last 60 years using various methods of vaporization and atomization. He quoted various investigators regarding the effects of heat, pressure and cooling and divided the work done on fuelizers into four schools of opinion: Those who believe in (*a*) standard carburetion, with an exhaust-heated vaporizer and holding the fuel in suspension long enough for the heat to do its work; (*b*) intense atomization, substituting for carburetion a metering device and injecting a thoroughly atomized fuel into the airstream in the induction system; (*c*) vaporizing the fuel in the presence of a small volume of air at high temperature and then cooling the rich mixture before it enters the cylinders; and (*d*) igniting part of the fuel charge and using the heat of the burned gases to vaporize the rest of the mixture. The fuels that each method is suited to handle were specified, ranging from alcohol to heater oil and gas oil.

The speaker pointed out that, in selecting or building fuelizers, the fuels most readily available where the engine is to be used should govern the type of device. He would do all his testing, he said, with a 28-32 gravity gas oil having an end point of not less than 725 deg. fahr., an initial point of not less than 450 deg. and a 50-per-cent point not under 525 deg. He would judge the device by its ability to treat such a fuel for 50 hr. with not more than 10 per cent crankcase-oil dilution. If the vaporizer, atomizer or fuelizer is a first-class job that heats the fuel properly, he said, there will be no smoke in the exhaust under load even after long idling periods. Such devices are on the market, he asserted.

Much that has been learned in the past regarding vaporization causes certain factors of success to stand out over a period of years, and these, he concluded, are embodied in part at least in a number of devices that can readily be adapted to motorboat engines operated on kerosene, fuel oil or heater oil.

Schwartz Explains Unique System

Under the title, Fuel Oil Is the Fuel for Marine Engines, Alfred Schwartz, consulting engineer of the Fuel Oil Motor Corp., described what he calls "the Schwartz cycle" whereby some amazing results are claimed to have been achieved with stock automobile engines using fuel oil. The system, which the speaker advocates as a means of conserving our petroleum resources and reducing fire hazard and operating cost, consists in injecting cooled compressed air into the fuel-air mixture in cylinders toward the end of the compression stroke. This produces the following effects, according to Mr. Schwartz: (*a*) reduces the heat of compression, enabling the use of a compression ratio of 9:1 without preignition or detonation; (*b*) supplies additional oxygen after partial combustion to complete the combustion of the carbon after the hydrogen is burned; (*c*) increases the mean effective pressure; (*d*) produces stratification of the charge and turbulence, a rich mixture being presented at the spark-plug, assuring prompt ignition, and the turbulence resulting from the high velocity of the injected air speeding up flame propagation; (*e*) results in smokeless exhaust free from unburned oil if a stepped cylinder and piston are used as the compressor.

Slides were shown of commercial gasoline engines to which the system had been applied experimentally, and the speaker told of results obtained on the dynamometer during three years of research work. For example, 23 hp. at 800 r.p.m. was produced by a two-cylinder T-head Palmer engine rated at 12 hp.; a Model-A Ford engine that produced 22.5 hp. at 1000 r.p.m. on gasoline gave 30.2 hp. with air injection on gasoline and 31 hp. on fuel oil; a Buick engine that developed 29 hp. at 1000 r.p.m., produced 34.5 hp. on both gasoline and fuel oil with air injection a Nova single-cylinder engine rated at 3 hp. produced 5 hp. with air injection, using both gasoline and fuel oil; and a Buda engine that developed 18.5 hp. on gasoline and 23.8 on fuel oil with injection. Some of the engines would not run at all on fuel oil without air injection.

The mean effective pressure with air injection ranges from 127 to 181 lb. per sq. in. in engines having an original m.e.p. of less than 100 lb., according to Mr. Schwartz, who asserted that pressures exceeding 200 lb. may be expected when the principle is thoroughly understood. Air-fuel ratios as high as 22:1 are employed, with excellent results, and the reduction in fuel consumption, he stated, averages better than 20 per cent.

Simple Injection System Described

Instead of presenting a prepared paper, Julius Kuttner, consulting engineer, gave an interesting talk on Diesel-engine injection systems. He pointed out the desirability of using heavy oils as fuel in motorboats because of the great reduction of fire hazard as compared with the use of gasoline. By lantern slides of diagrammatic drawings, he showed the difference in fuel systems of gasoline and oil engines and also compared the simplicity of the Oberhaensli design with what he termed the "museum" design of another fuel-injection system for another Diesel engine. The main parts of the former are obtainable generally in supply stores, and this, he said, is highly desirable even at the expense of the modification of the combustion chamber shown in slides, the replaceable parts being the ones that should be easily available.

Honing Considered in St. Louis

DEMONSTRATION of cylinder and piston honing and a paper on Honing in All Its Phases engaged the interested attention of the St. Louis Section at a meeting on June 7. The speaker, Joseph Sunnen, president of the Sunnen Products Co., of St. Louis, described the honing process, including finishing holes up to 1 in. in diameter.

Forty members of the Section and their guests attended the meeting, which was held at the Engineers Club of St. Louis.

Students Win Detroit Section Prizes

Gold medals in the undergraduate student thesis contest of the Detroit Section were awarded to Charles Porter and Joseph Bujak, senior engineering students at the University of Detroit, at the May 26 meeting of the Section.

Announcement of the awards was made by Robert N. Janeway, Vice-Chairman of the Section in charge of student activity.

The medals were awarded for a joint thesis on The Determination of Graphical Methods for Obtaining Shear and Bending Moment in Structural Members under Combined Axial and Transverse Loads.

Women and Aviation

MISS Elinor Smith was the attraction that drew 148 members and guests of the New England Section to the dinner and aeronautic session of the Section on May 25. The meeting was held at the Hotel Kenmore in Boston. Miss Smith, the well-known aviator, addressed the assemblage on the subject, Women and Aviation, a topic on which she is well qualified to voice some opinions based on much personal experience. It was a particularly timely talk in view of the solo flight from Newfoundland to Ireland by Amelia Earhart Putnam on May 20 and 21, the fifth anniversary of Lindbergh's famed New York-to-Paris flight.

Indianans Discuss Speedway Race

INDIANA Section's closing meeting of the year was devoted, as usual, to pre-race discussion of the Indianapolis Speedway 500-Mile Race, the cars entered and the race rules. The meeting, which was held on May 26 at the Hotel Severin in Indianapolis, brought out an attendance of 75 at the members' dinner and 215 for the technical session.

As an entertainment feature that had a relation to the subject of the meeting, a two-reel German motion-picture film entitled Wheel Shimmy, which was obtained from the Bureau of Standards, was exhibited.

At a brief business meeting the result of the mail-ballot election of officers of the Section for next year was announced as follows:

Chairman—Lee Oldfield, consulting and designing engineer

Vice-Chairman—H. M. Jacklin, associate professor of mechanical engineering, Purdue University

Vice-Chairman—Charles Merz, president, Merz Engineering Co.

Treasurer—Charles A. Trask, engineer, Rockwood Mfg. Co.

Secretary—Harlow Hyde

The first speaker on the program, Lee Oldfield, talked of the new types of car entered in the Memorial Day race and how near to stock cars were the semi-stock cars. He also discussed the "new gadgets."

Chester S. Ricker, chief of timing and scoring in the race, described how the 500-mile race is scored.

Following these informal talks, open discussion started with a capital D. Among the prominent men mixing into the affray were Fred E. Moskovics, the first Chairman of the Section; Harold Blanchard, technical editor of *Motor;* Ralph Snowberger, driver of stock race cars; Walter A. Olen, president and general manager of the Four Wheel Drive Auto Co.; Harry Miller, racing car designer and builder; Chester S. Ricker, consulting engineer and designer; William G. Wall, consulting engineer; Louis Schwitzer, president of the Schwitzer-Cummins Co.; and A. J. Poole, of the Bendix Aviation Corp.

As usual, the discussion led into a debate pro and con of the race rules, with some criticism of the present weight restrictions, which seem to handicap the larger stock-car engines. Some feeling was expressed that the rules for future races should take account of the piston travel or the horsepower so that semi-stock cars will not be so badly handicapped as compared with the smaller cars that have very high-speed engines.

Much complaint was voiced against leaky cars, especially some of the special racing types, that spill oil on the track and so present a serious menace to safety. The speakers felt that the rules will have to take care of this matter in some way.

Fuels and Oils Considered

AT the final Oregon Section meeting of the season, an interesting paper on Automotive Fuels and Lubricants was read by Chester A. Arents, senior in electrical engineering at Oregon State College, and was followed by animated discussion. Twenty-three members and guests attended the dinner and meeting, which were held in the Multnomah Hotel in Portland on May 6. New officers elected for the 1932-1933 Section year were announced as follows:

Chairman—H. T. Roberts, secretary, Roberts Motor Co.

Vice-Chairman—Robert W. Mann, manager, Isaacson Iron Works.

Secretary—Allen T. Welsh, maintenance engineer, Davidson Baking Co.

Treasurer—J. V. Savage, superintendent, Municipal Shops, City of Portland.

The new officers were introduced to the gathering, after which retiring Chairman H. W. Drake announced the discontinuance of monthly meetings for the summer.

Fred J. Bedford

INFORMATION has been received of the death on March 16 at his home in Dallas, Tex., of Fred J. Bedford, chief engineer in the technical sales department of the Magnolia Petroleum Co., with which company he had been connected for 20 years.

Mr. Bedford, who was elected to Member grade in the Society in 1919, was born at Oneonta, N. Y., in 1868, and was self-educated in electrical and mechanical engineering, electric lighting, refrigeration, bookkeeping and auditing through the courses of the International Correspondence School. From 1887 to 1894 he was engaged in railroad work, first with the Alabama Great Southern Railroad and then the St. Louis Southwestern Railroad. He next went into the electric-light field, with the Commerce Light & Telephone Co., in Texas, of which he became manager, and in 1902 was appointed manager of the Comanche Light & Power Co., of Lawton, Okla. During 1911 and 1912 he was Commissioner of Finance of the City of Lawton.

Robert Roux

INFORMATION has been received from the Walter Motor Truck Co., of Long Island City, N. Y., that Robert Roux, mechanical engineer of the company, died of kidney infection on May 4 at the Mount Sinai Hospital, New York.

Mr. Roux, who was elected to Associate membership in the Society in June, 1928, was born in France in 1899 and was graduated from Janson de Leilly in Paris with the degrees of Mechanical Engineer and Bachelor of Science in 1916. In 1923 he was commissioned as a first-class engineering officer in the French Navy, having served in the navy for six years as Diesel-engine engineer and professor of Diesel engines and mechanics on submarines. In 1924 he was a draftsman for the Sulser Diesel Motor Co. and during the succeeding two years was chief electrician on ships of the French Line.

After coming to the United States, Mr. Roux joined the Walter Motor Truck Co. as a mechanical engineer and was admitted to membership in the Metropolitan Section of the Society.

Cady B. Durham

FOLLOWING an emergency operation for appendicitis, Cady B. Durham, an executive on the president's staff of the General Motors Corp. at New York City, died at Miami, Fla., on May 10. He had been a Member of the Society since June, 1923. His home is in Flint, Mich., where for nearly a quarter of a century he had been connected with the Buick Motor Co.

Mr. Durham was born at Seneca Falls, N. Y., in 1872 and from 1904 to 1909 was superintendent of the manufacturing department of the Ingersoll-Rand Co. at Painted Post, N. Y. He joined the Buick company in the latter year as assistant superintendent and assistant to the general manager of factory No. 1. By 1927 he had been made vice-president and assistant general manager of the company, and in 1929 was appointed to the president's staff. In that year also he held the post of Police Commissioner of Flint. During the World War he was in sole charge of the production of Liberty airplane engines by the Buick company.

Summer Meeting Reviewed

(*Concluded from p. 30*)

S.A.E. Recommended Practice for Ball Studs to bring it up to date, and the cancellation of the S.A.E. Recommended Practices for Lubricator Cups and Carbureter Throttle Levers, both of which have become obsolete and for which the Division feels no standard is needed in the S.A.E. HANDBOOK.

Air Cylinders and Adapters

The Production Division reported a specification for Rotating Air-Cylinders and Adapters, which is a part of the tool-standardization program of the Sectional Committee on Standardization of Small Tools and Machine-Tool Elements, for which the Society is co-sponsor with the American Society of Mechanical Engineers and the National Machine Tool Builders Association, under the procedure of the American Standards Association. The report was approved for American Standard but not for publication as an S.A.E. Standard.

Action by the Standards Committee on the Division reports was referred to the Council and approved by it. Those approved and adopted will be issued to the members of the Society as soon as possible.

Meetings Calendar

Aeronautic Meeting—Aug. 30 and 31
Hotel Statler, Cleveland.
In connection with the Aeronautical Chamber of Commerce of America during the National Air Races.

Production Meeting—In Week of Oct. 3
174th Regiment Armory, Buffalo.
In cooperation with the National Metal Congress and Exposition.

Transportation Meeting—Oct. 4 to 6
Royal York Hotel, Toronto, Canada.

Detroit Production Work Approved

Council Encourages Detroit Section in New Activity and Adopts New Standards Regulations

APPROVAL of a petition from the Detroit Section for a local Production Division was granted at a regular meeting of the Council during the Summer Meeting at White Sulphur Springs. It was felt that the Society, especially in the Detroit district, has great possibilities for most effectively serving the production men of the industry. The active work of the Detroit Section along these lines should tie in nicely with the Society's Production Activity.

A revision of Standards Regulations, as submitted by the Standardization Policy Committee, was presented by Standards Committee Chairman Arthur Boor. The recommendations of the Committee were adopted and the belief was expressed that the new plan will simplify and expedite the formulation and promulgation of the standards that are urgently required by the industry. Detailed reference to the regulations and the divisional reports that were adopted is given elsewhere in this issue of the S.A.E. JOURNAL.

Council approval of President Scaife's appointment of A. F. Coleman to serve on the Automotive Transport Code Committee was granted.

Those who attended the Council sessions were: President Scaife; Vice-Presidents Bachman, Poole and Stout; Councilors Duesenberg, Shidle and Woolson; and Treasurer Spicer.

Summer Meeting Sociabilities

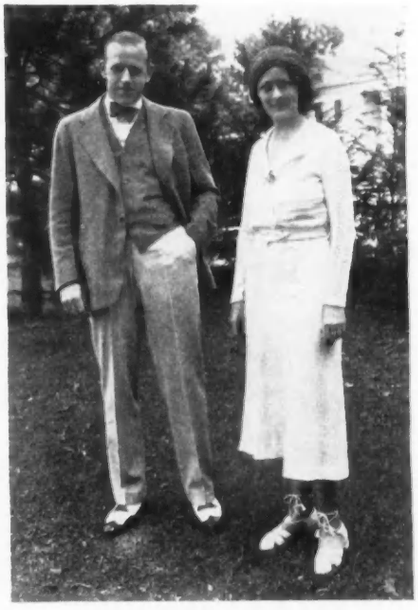
Golf, Bridge, Dancing and Piazza Conferences Enjoyed by Anti-Depressionists

OPPORTUNITIES for pleasant, non-technical sociability were fully enjoyed by the White Sulphur contingent. A little rain now and then interfered very little with those who came forward for a balanced diet of business and relaxation.

The Grand Ball on Thursday evening wasn't as "grand" as the 1929 event, so far as numbers were concerned, but who enjoys a crowded dance floor?

Among those who deserve credit for the success of the sports events are F. A. Sharpe, men's golf chairman, and The Industrial Alcohol Institute, Inc., through whose courtesy the golf booklets were supplied.

C. E. Johnson, president of the Piston Ring Co., supplied many thrills to members whom he invited to ride in his company's autogiro.



WINNERS OF GOLF TOURNAMENTS

Sandford Brown, Winner of Men's Golf, and Mrs. D. E. Gamble, Winner and also Chairman of Ladies' Golf

Results of Sports Events

	PRIZE	WINNER	SCORE
Ladies' Golf Tournament			
Championship	First	Mrs. D. E. Gamble	188 gross
	Second	Mrs. J. M. Simpson	200 gross
Handicap Flight	First	Mrs. Burns Dick	136 net
	Second	Mrs. Don Devor	139 net
Men's Golf Tournament			
Championship	First	Sanford Brown	162 gross
	Second	C. E. Dwyer	163 gross
Flight A	First	Jack W. White	129 net
	Second	L. R. Anderson	143 net
Flight B	First	Frank Jardine	132 net
	Second	R. M. Burckhalter	146 net
Flight C	First	J. S. Drake	134 net
	Second	W. G. Roby	136 net
Ladies' Bridge Tournament			
Monday	First	Mrs. Charles Hollerith	1,840
Tuesday	First	Mrs. G. S. Salzman	1,762
Wednesday	First	Mrs. A.S.Van Halteren	2,201
Thursday	First	Mrs. Ross Lewton	1,780

Personal Notes of the Members

Amelia Earhart Putnam's Great Accomplishment

Members of the Society derive unusual satisfaction from the remarkable exploit of Amelia Earhart Putnam, whose success in making a solo flight from the North American continent to Ireland has received worldwide acclaim.

In speaking with great modesty of her experience Mrs. Putnam, who has been a member of the Society since April, 1930, has repeatedly stated that her expedition was based exclusively on her personal desires rather than upon any attempt to establish new facts or scientific data. Although she insists upon giving the major share of credit to the excellent flying equipment, her friends do not for a moment lose sight of the wonderful courage, stamina and skill that were displayed by this well loved American girl.

When Mrs. Putnam reached London she received a message of congratulation from President Scaife, who expressed on behalf of all S.A.E. members the pride and affection that were inspired not only by the flight but by the ability and superior personal qualities which have always characterized Mrs. Putnam.

Following her landing in England she was elected the only woman member of the Aero Club of England and, upon going to Paris, was decorated with the Cross of the Legion of Honor.

N.A.C.C. Re-elects Macauley President

Alvan Macauley, president of the Packard Motor Car Co., was re-elected president of the National Automobile Chamber of Commerce at the annual meeting of the chamber in June. Among other Society members who were re-elected to office in the N.A.C.C. were Albert R. Erskine, president of the Studebaker Corp., as vice-president representing passenger cars, and Alfred Reeves, vice-president and general manager.

Ingalls Candidate for Governor

The aeronautic fraternity is much interested in the candidacy of the Hon. David S. Ingalls for the governorship of Ohio. As an avowed Wet, Mr. Ingalls won a signal victory in the Republican primaries last spring, and next November will come his test of political strength against his Democratic opponent.

Mr. Ingalls is only 33 years of age and has not held political office but came into public prominence through his appointment and subsequent activities as Assistant Secretary of the Navy for Aeronautics. He was born at Cleveland in 1899 and received his higher education at the University School in Cleveland; St. Paul's School in Concord, N. H.; Yale College in New Haven, from which he was graduated in 1920 with the degree of bachelor of arts; and at Harvard College, which in 1923 conferred upon him the degree of bachelor of laws.

During the World War Mr. Ingalls was a naval aviator with the American forces and served with great distinction. Since his election as an Associate Member in September, 1929, he has participated actively in the Aeronautic Meetings of the Society and has aided in the furtherance of S.A.E. ideals in aeronautics.

U. of D. Degree Conferred on Nichols

On June 10 the University of Detroit conferred the degree of mechanical engineer upon W. W. Nichols, vice-president and mechanical engineer of D. P. Brown & Co., of Detroit. The citation specified that the degree was conferred for the sake of honor, among other things, for a lifetime spent in mechanical industry and its direction in America and Great Britain and for the devotion of much time and effort to the field of economics and of education of the oncoming generation for the benefit of the university.

Besides his membership in the S.A.E., Mr. Nichols is a member of the American Society of Mechanical Engineers, the American Society for Testing Materials, the Society of Industrial Engineers, the Detroit Engineering Society, the Verein Deutscher Ingenieure, the Societe des Ingenieurs de l'Automobile, the Institute of Scientific Management of Warsaw, Poland, and the Masarykova Akademie Prace of Prague, Czechoslovakia.

Bassett Elected A.S.T.M. Vice-President

The election of William H. Bassett, metallurgical manager of the American Brass Co., of Waterbury, Conn., as vice-president of the American Society for Testing Materials, to serve for one year, was announced at the annual meeting of the society at Atlantic City on June 20.

Mr. Bassett has been a Member of the S.A.E. since 1917 and is a past-president of the American Institute of Mining and Metallurgical Engineers.

For the two administrative years immediately preceding, the president of the A.S.T.M. has been an S.A.E. Member. F. O. Clements, technical director of the General Motors Corp. Research Laboratories, Detroit, has just completed his term of office and followed K. G. MacKenzie, consulting chemist for The Texas Co., New York City.

Mr. Bassett received the degree of bachelor of science from the Massachusetts Institute of Technology in 1891 and in his professional career has been chemist and superintendent of the Popes Island Mfg. Co., of New Bedford, Mass., for five years; chief chemist of the Newark Works of the New Jersey Zinc Co.; and since 1912 successively technical superintendent, chief chemist and metallurgist, and metallurgical manager of the American Brass Co.

S.A.E. Members Elected M.I.T. Trustees

Election of Alfred P. Sloan, Jr., president of the General Motors Corp., as a life member of the corporation of the Massachusetts Institute of Technology, and Jerome C. Hunsaker, vice-president of the Goodyear-Zeppelin Corp., of Akron, Ohio, as a term member to serve for five years, was announced at Cambridge, Mass., on June 9 by Dr. Karl T. Compton, president of the institute.

Elected Vice-Presidents of Gabriel

Two members of the Society were elected to vice-presidencies of the Gabriel Co., of Cleveland, at a meeting of the board of directors in June. They are David Benjamin, formerly secretary of the company, and Harry D. Kinnear, formerly Pacific Coast representative. Mr. Kinnear was elected vice-president in charge of manufacturers' sales. George H. Ralls, who was president and a director, is succeeded by John J. Batterman but continues as a director.

Alfred E. Ballin has been made vice-president in charge of engineering by the Nordberg Mfg. Co., of Milwaukee, builders of Diesel and steam engines and other heavy machinery.

Walter H. Beech, until lately president of the Curtiss-Wright Airplane Co., of Robertson, Mo., recently organized and was elected president of the Beech Aircraft Co., of Wichita, Kan.

Roy O. Dent, who formerly was night service manager for Davidson Bros. Garage, of Morgantown, W. Va., is now employed as a licensed engine mechanic by Pennsylvania Airlines, Inc., at the Cleveland Municipal Airport, at Cleveland.

Owing to the removal of Gear Processing, Inc., from Detroit to new and larger factory quarters in Cleveland, the address of **Roy B. Fehr,** technical director of the organization, is also changed accordingly.

Alpheus Flower recently resigned his directorship in Zephyr Pistons, Ltd., of Lowestoft, England, and is now interested in the development of a new bimetallic piston of his own design.

A. H. Gfrorer, chief engineer for the last 13 years of the Automatic Transportation Co., of Chicago, and also chief engineer of the Barrett Cravens Co., of Chicago, for the last 3 years, retired from these positions at the end of June, with no definite plans for the future. He has been connected with the material-handling industry in all its phases since 1910.

A. C. Hamilton has relinquished his position of aeronautic engineer with the Automotive Fan & Bearing Co., of Jackson, Mich., and is temporarily located at Royal Oak, Mich.

James F. Knudson, Jr., formerly a draftsman and checker with the Cur-

(*Concluded on p.* 60)

Applicants Qualified

The following applicants have qualified for admission to the Society between April 9 and June 10, 1932. The various grades of membership are indicated by (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate; (S M) Service Member; (F M) Foreign Member.

ALLEN, J. R. (M) aircraft designing engineer, aircraft engineering division, Ford Motor Co., *Dearborn, Mich.;* (mail) 22470 Nona Avenue.

ANGSTMAN, ROGER W. (M) president, Roger Angstman Co., 2482 West Grand Boulevard, *Detroit.*

ANGUS, WILLIAM WORTHINGTON (A) sales manager, Collins & Aikman of Canada, Ltd., New Birks Building, *Montreal, Que., Canada.*

BACHLE, CARL F. (J) research engineer, Continental Aircraft Engine Co., Detroit; (mail) 278 Touraine Road, *Grosse Pointe Farms, Mich.*

BARTON, CHARLES ALLEN (F M) general superintendent, rolling-stock and shops department, Rio de Janeiro Tramway Light & Power Co., Ltd., Caixa do Correio 571, *Rio de Janeiro, Brazil.*

BECK, WILLIAM HENRY (A) automotive and industrial engineer, Sherwood Bros., Inc., Baltimore Trust Building, *Baltimore.*

BISTROM, F. VERNON (J) engineer, truck-equipment division, Isaacson Iron Works, *Seattle;* (mail) 2141 10th Avenue, West.

BOUDREAU, JAMES E. (A) division manager, Ethyl Gasoline Corp., New York City; (mail) 27 Kilburn Road, *Garden City, N. Y.*

BOWEN, B. H. (A) district manager, Firestone Tire & Rubber Co., 70 West End Avenue, *New York City.*

BRODIE, W. WARREN (A) president, B. & J. Auto Spring Co., 142 Clifton Place, *Brooklyn, N. Y.*

BROWN, L. K. (A) manager, Parliament & Carlton, *Toronto, Ont., Canada.*

CALDWELL, J. RALPH (A) owner Caldwell Trucking Co., *Detroit;* (mail) 6530 Epworth Boulevard.

CAMPBELL, WILLIAM SALTON (A) instructor of motor engineering, Vancouver Technical School, *Vancouver, B. C., Canada;* (mail) 3824 Yale Street.

CHADDICK, HERBERT H. (S M) assistant mechanical engineer, in charge of automotive transportation, Veterans Administration, *City of Washington;* (mail) Room 791 Arlington Building.

CHANDLER, N. RAYMOND (F M) general manager for India, Rolls Royce, Ltd., Hughes Road, *Bombay, India.*

COCHRANE, ROBERT A. (M) chief inspector, Department of Water and Power, City of Los Angeles, 207 South Broadway, *Los Angeles.*

CONBOY, RAYMOND G. (A) Ray Conboy Buick Service, 4121-4125 Park Avenue, *New York City.*

DIEFENDORS, CLARENCE BYRON (A) assistant technical manager, Vacuum Oil Co., Inc., *Kansas City, Mo.;* (mail) care of White Eagle Oil Corp., Federal Reserve Bank Building.

DIETER, ARTHUR R. (A) 344 West 72nd Street, *New York City.*

EARL, ELLIOTT (J) research assistant, Pennsylvania State College Engineering Experiment Station, *State College, Pa.*

ERICSON, GEORGE R. (M) patent counsel, Carter Carburetor Corp., 2838 North Spring Avenue, *St. Louis.*

FISHER, FRED J. (A) branch manager, Sterrett Operating Service, Inc., 1611 Argyle Avenue, *Baltimore.*

FREI, J. RUDOLF (J) chief draftsman, Scintilla Magneto Co., Inc., *Sidney, N. Y.;* (mail) 36 River Street.

FRUEHAUF, ROY (J) salesman, Fruehauf Trailer Co., 3840 South Michigan Avenue, *Chicago.*

FRUHWIRTH, ADOLF EDWARD (F M) chief chemist, Vacuum Oil Co., Inc., *Cairo, Egypt.*

GALLAHER, RAYMOND W. (M) manager, lubrication department, Pan American Petroleum Corp., *New Orleans;* (mail) P. O. Box 2.

GIBBARD, GEORGE H. (A) service-school instructor, General Motors Products of Canada, Ltd., Oshawa, Ont., Canada; (mail) 23 Fern Avenue, *Toronto, Ont., Canada.*

GILLESPIE, DEAN M. (M) district manager, The White Co., 601 East 18th Avenue, *Denver.*

GRAHAM, ERWIN W. (J) student engineer, Chrysler Corp., *Detroit;* (mail) 13220 Woodward Avenue.

GRAY, ROY B. (S M) chief of division, Bureau of Agricultural Engineering, Department of Agriculture, *City of Washington.*

GROVES, MARTIN V. (A) assistant superintendent, United States Trucking Corp., New York City; (mail) 2227 Coney Island Avenue, *Brooklyn, N. Y.*

GUTHIER, RAY E. (A) superintendent of transportation, Wisconsin division, Northern States Power Co., 2 South Barstow Street, *Eau Claire, Wis.*

HALL, FRED L. (A) Eastern sales manager, Bendix-Westinghouse Automotive Air Brake Co., 5001 Center Avenue, *Pittsburgh.*

HALLADAY, HOLLIS P. (A) sales engineer, Oakes Products Corp. Division, Houdaille-Hershey Corp., North Chicago, Ill.; (mail) 312 Aspen Road, *Birmingham, Mich.*

HARKRADER, WALLACE M. (A) assistant sales manager, Perfect Circle Co., *Hagerstown, Ind.*

HARRINGTON, JOHN HOWARD (J) gas-appliance sales, Dayton Power & Light Co., *Dayton, Ohio;* (mail) 2435 Argonne Avenue.

HEISS, JOHN PAUL (J) development engineer on engines, transmission and axles, Buick Motor Co., *Flint, Mich.*

HERBERT, DONALD E. (A) manager, lubrication department, H. F. Wilcox Oil & Gas Co., *Tulsa, Okla.;* (mail) 1336 South Jamestown Avenue.

HERSCHEL, WINSLOW H. (S M) associate physicist, lubrication and liquid fuels section, heat and power division, Bureau of Standards, City of Washington; (mail) 6305 Florida Street, *Chevy Chase, Md.*

HEWLETT, RALPH CLINTON (J) electrical engineer, Eclipse Aviation Corp., 545 North Arlington Avenue, *East Orange, N. J.*

HIGGINS, ELIOT W. (M) acoustical engineer, Burgess Battery Co., Madison, Wis.; (mail) 542 New Center Building, *Detroit.*

HILL, JOSEPH R. (M) manager, fuel service division, Standard Oil Development Co. Research Laboratories, P. O. Box 485, *Linden, N. J.*

HINCHMAN, HARVEY SHARPLES (S M) design draftsman, Naval Aircraft Factory, Philadelphia; (mail) 23 West End Avenue, *Merchantville, N. J.*

HOAR, EVERETT. (A) president, Hoar's Transport Co., 44 Oxford Street, *Toronto, Ont., Canada.*

HOPKIN, WILLIAM B. (A) automobile mechanic, Edmonton Motors, Ltd., *Edmonton, Alta., Canada;* (mail) 10912 68th Avenue.

HUNT, CHARLES H. (J) engineering student, Swarthmore College, *Swarthmore, Pa.*

JONES, THOMAS M. (A) vice-president, sales manager, Cedar Rapids Engineering Co., 902 North 17th Street, *Cedar Rapids, Iowa.*

KILDUFF, FRANK B. (A) production manager, Oriental Textiles Co., Oshawa, Ont., Canada; (mail) 41 Chudleigh Avenue, *Toronto, Ont., Canada.*

KISSLING, F. R. (M) vice-president, Wheeler Metal Products Corp., East Cleveland, Ohio; (mail) 3809 Montevista Road, *Cleveland Heights, Ohio.*

KNOPE, PHILLIP F. (J) draftsman, 6625 Mack Avenue, *Detroit.*

KURT, O. EDWARD (J) tire-development engineer, United States Rubber Co., 6600 East Jefferson Avenue, *Detroit.*

KUSTER, W. H. (M) consulting engineer in charge of research and design, Shaw-Palmer-Bakewell Co., 619 East Third Street, *Los Angeles.*

LAMBERT, CHARLES WADE (M) equipment engineer, Virginia State Highway Department, State Office Building, *Richmond.*

LASSMANN, MAX (J) junior engineer, Chrysler Corp., Detroit; (mail) 235 Highland Avenue, *Highland Park, Mich.*

MAEDA, RIICHI (F M) assistant professor of mechanical engineering, Osaka University of Engineering, *Osaka, Japan.*

MAGRUDER, FIRST-LIEUT. CARTER B., U. S. A., (S M) post graduate student, Purdue University, *West Lafayette, Ind.;* (mail) 207 Union Building.

MARSHALL, HARRY LYON (A) salesman, Sunset Pacific Oil Co., *Los Angeles;* (mail) 8518 Saturn Avenue.

MARTIN, A. D. (A) field representative, Ethyl Gasoline Corp., *Seattle;* (mail) 5005 Phinney Avenue.

MCBRIDE, S. R. (M) president, McBride's Garage, Ltd., 133 Pears Avenue, *Toronto, Ont., Canada.*

MEYER, JOHN (J) patent draftsman and detailer, Wright Aeronautical Corp., Paterson, N. J.; (mail) 319 Colfax Avenue, *Clifton, N. J.*

MILLER, F. LAVERNE (J) research chemist, Standard Oil Development Co., *Elizabeth, N. J.;* (mail) 500 Jersey Avenue.

MILLER, LIEUT-COL. FREDERICK WILLIAM, (A) manager, Collins & Aikman of Canada, Ltd., *Toronto, Ont., Canada;* (mail) Room 303, 465 Bay Street.

MILLER, RAY S. (S M) inspector of tanks, United States Army, Ordnance Department, Fort George G. Meade, Md.; (mail) *Linthicum Heights, Md.*

MITREVICH, KONSTANTIN S. (F M) assistant superintendent, machine shop, Amtorg Trading Corp., Cheliabinsk Tractor Plant, Cheliabinsk, U.S.S.R.; (mail) care Amtorg Trading Corp., 261 Fifth Avenue, *New York City.*

MORIARTY, J. B. (A) manager, automotive sales, paint and varnish division, Canadian Industries, Ltd., *West Toronto, Ont., Canada.*

MORRISON, WALTER GEORGE (M) maintenance superintendent, City of Santa Monica, *Santa Monica, Calif.;* (mail) 2262 Clover Field Boulevard.

NAVARO, ALFRED (A) instructor in automotive electricity, Automotive High School, *Cincinnati;* (mail) 3476 Morrison Place.

NEE, DAN J. (A) partner, DeLuxe Windshield Co., DeLuxe Products Mfg. Co., Emeryville, Calif.; (mail) 1440 Broadway, *San Francisco.*

OLVER, ALBERT STEPHEN (J) automotive contact representative, Ethyl Gasoline Corp., *Toronto, Ont., Canada;* (mail) 2 Ridge Drive, Toronto 5.

O'NEAL, ROBERT PAUL (J) engine overhaul supervisor, American Airways, Inc., Robertson, Mo.; (mail) 5887 Theodosia Avenue, *St. Louis.*

OSZMAN, H. E. (M) superintendent of transportation, Northern States Power Co., 15 South Fifth Street, *Minneapolis.*

PATRICK JOHN SHAW (J) lecturer in mechanical engineering, Municipal Technical College, Park Street, *Hull, England.*

PATZIG, GUIDO MEINRICH ALFRED (F M) chief engineer, Wanderer Werke A/G, Siegmar bei, Chemnitz i. Sa., Germany; (mail) 1 Franz Schubertstrasse, *Rabenstein, Germany.*

PAWLOWSKI, FELIX WLADYSLAW (M) Guggenheim professor of aeronautics, University of Michigan, *Ann Arbor, Mich.;* (mail) 925 Greenwood Avenue.

PECK, DONALD E. (J) engine designer, H. E. Dodge Boat & Plane Corp., Newport News, Va.; (mail) 2429 Pearl Avenue, *Detroit.*

PETZOLD, EDWARD OSCAR (J) lubricating research engineer, Standard Oil Development Co., *Elizabeth, N. J.;* (mail) 530 Vine Street.

PLACE, BION C. (M) engineer and designer, Gagnier Fibre Products Co., 14401 Woodrow Wilson Avenue, *Detroit.*

PORTER, BAKER EDDY (A) fleet manager, Olson Baking Co., 902 East 14th Street, *Los Angeles.*

PROSSER, WILLIAM B. (A) manager, Tipton plant, Perfect Circle Co., *Tipton, Ind.*

RAMMING, WILLIAM A., JR. (J) general engineering, Busch-Sulzer Bros., Diesel Engine Co., St. Louis; (mail) 316 Newport Avenue, *Webster Groves, Mo.*

RATKE, CLEMENT J. (J) shipping department, Rouge Plant, Ford Motor Co., *Dearborn, Mich.;* (mail) 5836 Kendal Avenue.

RISK, THOMAS HARRISON (J) junior dynamometer test engineer, Vacuum Oil Co., Inc., *Paulsboro, N .J.*

SETH, STEPHEN (A) president, Stephen Seth & Co., Inc., 882 Park Avenue, *Baltimore.*

SHARP, MAJOR (A) representative, Bendix-Westinghouse Automotive Air Brake Co., 5001 Centre Avenue, *Pittsburgh.*

SMITH, FRANCIS A. (A) Standard Oil Co. of New York, *Buffalo;* (mail) 16 Woodette Place.

SNYDER, J. F. (A) automotive engineer, Standard Oil Co. of New York, Inc., Boston; (mail) 81 Elm Street, *Belmont, Mass.*

SPENCE, GUY H. (A) commercial service representative, Ford Motor Co., City of Washington; (mail) R.F.D. 5, *Alexandria, Va.*

STEWART, JOHN LESLIE (M) general manager, Canadian Automobile Chamber of Commerce, 1006 Lumsden Building, *Toronto, Ont., Canada.*

SUEZ, KYEUYOONG ALBERT L. (J) Anderson & Farroggiaro, *Shanghai, China;* (mail) 275 YuYuen Road.

SWEET, JOSEPH B. (M) chief engineer, Reliable Automotive Co.; service manager, Mack-International Motor Truck Co., *Fresno, Calif.;* (mail) 345 North Broadway.

SWIGART, JOHN T. (M) assistant general service manager, White Co., *Chicago;* (mail) 8135 Harper Avenue.

TAUSSIG, WARREN A. (M) general superintendent, Southwestern Transportation Co., Cotton Belt Building, *Texarkana, Ark.*

THAYER, HALSEY W. (M) superintendent of transportation and equipment, Department of Water and Power, City of Los Angeles, 207 South Broadway, *Los Angeles.*

THORP, JOHN W. (J) draftsman, Boeing School of Aeronautics, Oakland, Calif.; (mail) *Lockeford, Calif.*

TIRRELL, EDWARD L. (M) automotive engineer, Utilities Management Corp., 120 Wall Street, *New York City.*

TOEWS, GUSTAV P. (S M) senior engineer, aeronautical engine laboratory, Naval Aircraft Factory, *Philadelphia.*

VEDOVELL, R. J. (A) sales manager, Chicago Rawhide Mfg. Co., 1301 Elston Avenue, *Chicago..*

WADE, JAMES H. (A) shop superintendent, The White Co., 458 Melwood Street, *Pittsburgh.*

WALKER, JOHN B. (A) vice-president, Greyhound Management Co., 920 Superior Avenue, *Cleveland.*

WERTZ, DANIEL L. (M) sales engineer, Eclipse Machine Co., Elmira, N. Y.; (mail) 8-205 General Motors Building, *Detroit.*

WHITCOMB, JOSEPH CARLTON (J) assistant engineer, Maxim Motor Co., *Middleboro, Mass.;* (mail) 28 Pierce Street.

WIGGIN, G. O. (J) 95 Elm Street, *Lewiston, Maine.*

WINTER, HERBERT G. (M) consultant on aerodynamic application, Briggs Mfg. Co., Detroit; (mail) 125 Tyler Avenue, *Highland Park, Mich.*

WOERNER, ERNEST M. (J) student engineer, Caterpillar Tractor Co., East Peoria, Ill.; (mail) 227 Cooper Street, *Peoria, Ill.*

Applicants for Membership

The applications for membership received between May 15 and June 15, 1932, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

ATWELL, HAROLD V., chemical engineer, Gasoline Products Co., *New York City.*

BARR, ROBERT, manager and president, Winchester Garage Co., Ltd., *Toronto, Ont., Canada.*

BONAME, ROBERT VICTOR LOUIS, research chemist, McCormick's & Co., *Baltimore.*

BRADLEY, J. T., JR., president, Missouri Valley Refining Co. and Saline Oil Corp., *Tulsa, Okla.*

BUNCE, JOHN LEE, service manager, Pratt & Whitney Aircraft Co., *East Hartford, Conn.*

CAMERON, HUGH S., instructor in mechanical technology, Pratt Institute, *Brooklyn, N. Y.*

CARLSON, PAUL H., shop superintendent, A. G. Schaefer Motor Co., *Olympia, Wash.*

CARPENTIER, MELBOURNE L., chassis-design engineer, Chrysler Corp., *Detroit.*

DAVY, CHARLES E., division of engine operations, engineering department, Chrysler Corp., *Detroit.*

DIEDERICH, GEORGE N., publisher, *Chevrolet Dealers News, Chicago.*

FADELY, JAMES M., service engineer, Warner Gear Co., *Muncie, Ind.*

FORSHEE, KENT, designer, A. C. Spark Plug Co., *Flint, Mich.*

FOX, JAMES FULTON, mechanical engineer, Bureau of Standards, *City of Washington.*

GOUGLER, CHARLES L., president, C. L. Gougler Machine Co., *Kent, Ohio.*

GRAY, GEORGE E., manager, Shell Eastern Petroleum Products, Inc., *New York City.*

GUSTAFSSON, NILS G. A., chief engineer, Svenska Ackumulator A. B., Jungner, *Stockholm, Sweden.*

HANS, EDMUND, engineer, 71 Willis Avenue, West, *Detroit.*

HARRIS, LUTHER, maintenance of aircraft, American Airways, *New York City.*

HEDGES, EARL J., assistant engineer, Hedges Motor Co., *Seattle.*

HOUSER, WILLIAM ARNOLD, general service manager, Cadillac Motor Car Co., *Detroit.*

HOWARD, WILLIAM HAND BROWNE, production manager, General Refining Co., *Baltimore.*

JACKSON, A. P., Quaker State Oil Refining Co., *Los Angeles.*

KEPLINGER, JOHN C., vice-president in charge of sales, Hercules Motors Corp., *Canton, Ohio.*

KING, HENRY FRANCIS, research associate, Massachusetts Institute of Technology, *Cambridge, Mass.*

LAWLER, CHARLES H., service engineer, The Buda Co., *Harvey, Ill.*

LEE, WARREN K., sales engineer, Wilkening Mfg. Co., *Philadelphia.*

LEUKHARDT, A. R., eastern engineering representative, Bendix-Westinghouse Automotive Air Brake Co., *New York City.*

MARSHALL, ARTHUR MURRAY, Malkin Motor Freight Co., *Boston.*

MIHELICH, FRANK J., JR., time study, Haynes Corp., *Chicago.*

MOORE, JACK, electrician, Sunset Electric Co., *Seattle.*

O'BRIEN, I. T., general production manager, Dodge Bros., *Detroit.*

PEARSON, GEORGE F., draftsman, Robey-Lambert Diesel Engine Co., *City of Washington.*

PRICKETT, RUSSELL, instrument maker, Princeton University, *Princeton, N. J.*

ROBICHAUD, WILLIAM ALFRED, proprietor and owner, William A. Robichaud, *Falmouth, Mass.*

SCHAIRER, GEORGE SWIFT, student, Swarthmore College, *Swarthmore, Pa.*

SCHOEPFER, ALFRED G., chief inspector, Fisher Body Corp., *Pontiac, Mich.*

SCHWARZ, ALFRED, vice-president, Fuel Oil Motors Corp., *New York City.*

SMALLEY, LEE L., chief engineer, Bendix-Cowdrey Brake Tester, Inc., *South Bend, Ind.*

SMITH, WILLIAM M., design draftsman, Consolidated Aircraft Corp., *Buffalo.*

STEINIGER, ALFRED H., service office manager, head tester, Cadillac Motor Car Co., *Brooklyn, N. Y.*

SUTTLES, OMAR, Omar's Experimental Laboratory and Omar's Garage, *Los Angeles.*

TEICHMANN, FREDERICK R., assistant professor of aeronautic engineering, New York University, *New York City.*

THOMPSON, HENRY L., general shop foreman, Los Angeles Motor Coach Co., *Los Angeles.*

THOMPSON, JOHN PAUL, junior aeronautic engineer, Naval Aircraft Factory, League Island Navy Yard, *Philadelphia.*

TREGOE, BENJAMIN B., sales manager, Woodall Industries, Inc., *Detroit.*

VAN DEVENTER, FRANCIS MARION, general foreman, Department of Water and Power, City of Los Angeles, *Los Angeles.*

WALLACH, IRVING DAVID, senior, Webb Institute of Naval Architecture, *New York City.*

WATSON, PATRICK LLOYD, manager, motor department, Sutton & Co., Ltd., *London, E. C. 1, England.*

WIDMAN, JOHN C., engineering department, Murray Corp. of America, *Detroit.*

WOODIER, HUGH D., machine designer, Austin Mfg. Co., *Harvey, Ill.*

Notes and Reviews

AIRCRAFT

An Automatic Variable-Pitch Airscrew. By H. C. H. Townend. Published in *The Journal of the Royal Aeronautical Society*, February, 1932, p. 111. [A-1]

Some wind-tunnel experiments were made at the National Physical Laboratory on a variable-pitch airscrew that changes its pitch automatically. The change in pitch is produced by the resultant effect of centrifugal and aerodynamic forces. Reduction in air density, as by increase in altitude, causes an increase in pitch. In the event of engine failure, the blades assume the position of minimum drag, according to the author.

A tentative design for a model screw, together with tests thereon, are described. Tests indicate that, if the friction in the bearings about which the change in pitch occurs can be made reasonably small, it should be possible to construct a satisfactory full-scale propeller.

The author refers to a recent published account in French of an automatic variable-pitch airscrew working on exactly the same principle and which has been tested in flight.

As an appendix to Mr. Townend's paper, an abstract is given of the French account of the full-scale screw.

Analysis of Landing-Gear Fittings. By Albert Epstein. Published in *Aviation Engineering*, February, 1932, p. 9. [A-1]

Landing-gear fittings, while not radically different from other fittings used on an airplane, present certain features and problems peculiar to themselves. The fact that the structure usually is indeterminate, the author points out, permits the fittings to have an appreciable effect upon how moments are distributed between struts and also upon the magnitude of the moments at the fuselage joints.

This article indicates the factors that should be considered in the analysis of the problem, with certain typical fittings used as examples.

Climb Relationships. By W. R. Andrews. Published in *The Aircraft Engineer*, supplement to *Flight*, Jan. 29, 1932, p. 96a (1). [A-1]

The author explains that the atmosphere of the British Isles often renders difficult the making of elaborate calculations for the change in climb relationships attendant upon a change in weight. For the investigation described, a hypothetical engine and aircraft were chosen and the performance calculated for an increase in weight from 5000 to 9000 lb.

The range of the investigation included: (*a*) climbing speed at any particular weight, knowing the speed for any other weight; (*b*) rate of climb off the ground for any weight, from the known conditions at another gross weight; (*c*) absolute ceiling, in terms of the ground-level rate of climb, from the rate of climb and absolute ceiling for another weight; and (*d*) rate of climb and absolute ceiling, in terms of the weight, engine output, airscrew efficiency and stalling speed, where test data are not available.

As a result of this study, the author develops formulas for estimating the change in climb conditions and ceiling for a change in the gross weight of an aircraft.

The article is concluded in the Feb. 26, 1932, issue of *Flight*.

Aircraft Vibration. By H. Constant. Published in *The Journal of the Royal Aeronautical Society*, March, 1932, p. 205. [A-1]

Detection of the existence of excessive vibration usually is through its physiological effect on the occupants of the aircraft, according to the author, and from this aspect the problem is, in the main, viewed and presented in this paper.

After preliminary trials with unsuitable instruments, the Cambridge Instrument Co. adapted for the tests the principle used in its standard portable vibrograph. The newly developed instrument is described and illustrated and the "vibrograms" analyzed.

The first step in the investigation was the exploration of the general vibration characteristics of an aircraft. Vibrations were forced and measured in a complete aircraft, mounted in such a manner as to simulate as closely as possible the conditions present in flight.

To obtain some knowledge of those characteristics of vibration which most affect the human frame, a contrivance was arranged whereby an observer could be subjected to a vibration the amplitude and frequency of which could be altered at will. The method was not entirely reliable, but the result of a large number of observations was taken as a rough indication of the variation of the effects involved.

The sources of vibration—engine, propeller, effects of slipstream, tail and wing flutter and buffeting—are discussed at length in the light of the results of vibrograph tests.

Pressure-Distribution Tests on a Series of Clark-Y Biplane Cellules with Special Reference to Stability. By Richard W. Noyes. N. A. C. A. Report No. 417, 1932; 29 pp., with tables and charts. [A-1]

Wind-Tunnel Research Comparing Lateral-Control Devices, Particularly at High Angles of Attack—I-Ordinary Ailerons on Rectangular Wings. By Fred E. Weick and Carl J. Wenzinger. N. A. C. A. Report No. 419, 1932; 26 pp., with tables and charts. [A-1]

Determination of Stresses and Deformations of Aircraft Propellers. By Friedrich Seewald. Translated from *Berichte und Abhandlungen der W. G. L.*, No. 14, December, 1926; supplement to *Zeitschrift für Flugtechnik und Motorluftschiffahrt*. N. A. C. A. Technical Memorandum No. 670, May, 1932; 24 pp., 28 figs. [A-1]

Zur Genäherten Berechnung Vielholmig-Parallelstegiger, Ganz- und Halbfreitragender, Mittelbar und Unmittelbar Belasteter Flügelgerippe. By Eugen Sänger. Published in *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, May 14, 1932, p. 245. [A-1]

A system of design calculations for the truss structure of full and semi-cantilever, multi-sparred wings, with parallel, directly and indirectly loaded ribs, is herein set forth.

Die Seitenstabilität des Ungesteuerten Normalfluges und ihre Technischen Vorbedingungen. By Gotthold Mathias. Published in *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, April 14, p. 193, and April 28, 1932, p. 224. [A-1]

Previous publications on the subject of yawing and lateral stability have, in the opinion of the author, dealt almost exclusively with the mathematical and theoretical aspects of the subjects. In this article, a technical note of the German institute for aeronautical research, he endeavors to fill more directly the need for information on the part of the aircraft builder, presenting in simplified form the theory of lateral stability and explaining the bearing of this theory on constructional requirements.

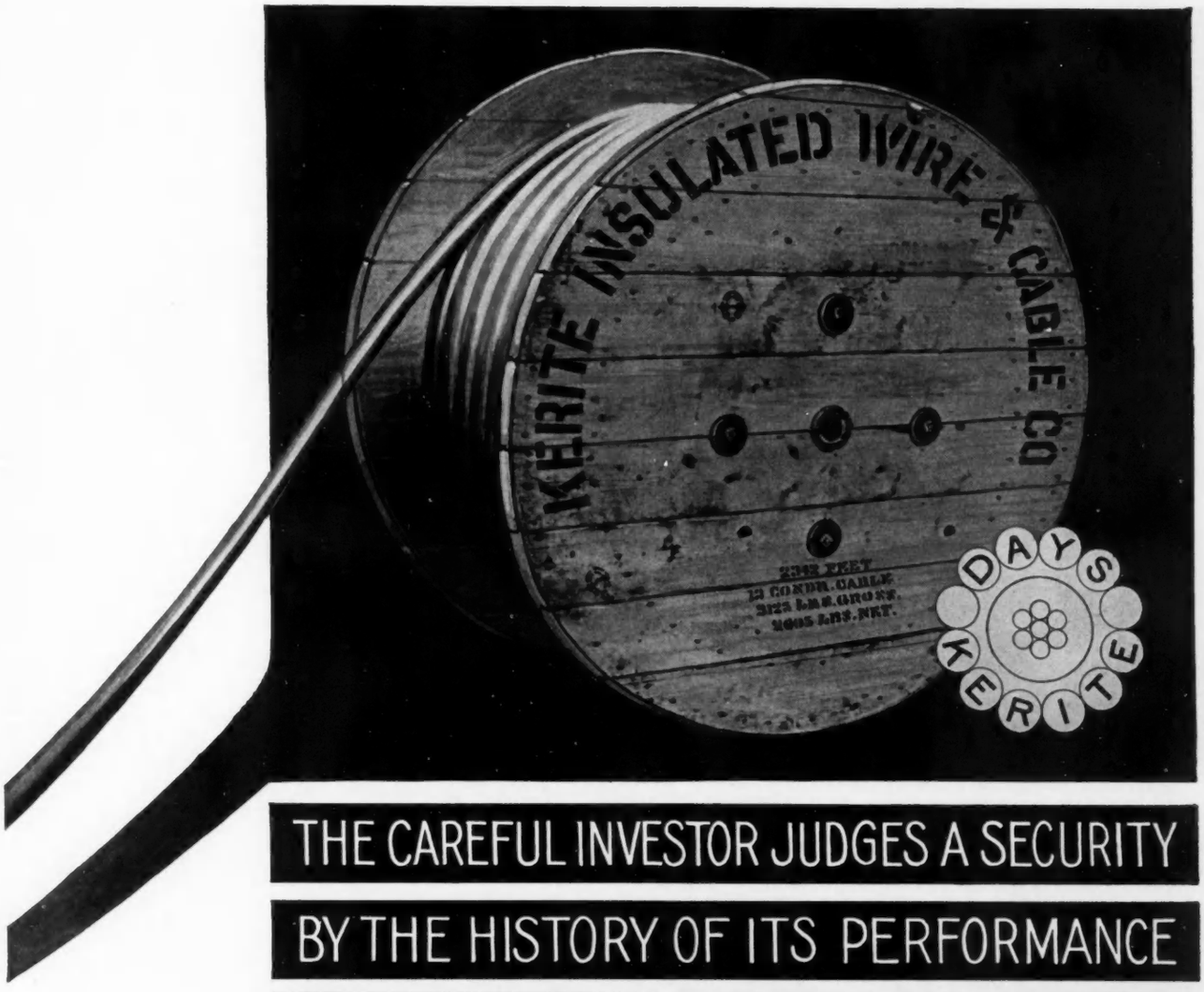
Triebwerkanordnungen bei Mehrmotorenflugzeugen. By Alfred Richard Weyl. Published in *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, April 28, 1932, p. 213. [A-1]

Four different arrangements of engine-propeller assemblage in multi-engine aircraft are here compared. The aspects considered include aerodynamic, flight, static, constructional, cooling and fuel feeding, propeller protection, repairs, reliability, noise and the carry-

(*Continued on next left-hand page*)

These items, which are prepared by the Research Department, give brief descriptions of technical books and articles on automotive subjects. As a rule, no attempt is made to give an exhaustive review, the purpose being to indicate what of special interest to the automotive industry has been published.

The letters and numbers in brackets following the titles classify the articles into the following divisions and subdivisions: *Divisions*—A, Aircraft; B, Body; C, Chassis Parts; D, Education; E, Engines; F, Highways; G, Material; H, Miscellaneous; I, Motorboat; J, Motorcoach; K, Motor-Truck; L, Passenger Car; M, Tractor. *Subdivisions*—1, Design and Research; 2, Maintenance and Service; 3, Miscellaneous; 4, Operation; 5, Production; 6, Sales.



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BETHLEHEM ALLOY STEELS

Notes and Reviews

Continued

ing off of exhaust gas. The arrangements compared include one in which the powerplant assemblage is above the wing, one in which it is below and two in which it is on the same plane with the wing. One of the last two arrangements is a tandem layout, while the other has the engine and propeller forward of the wing.

Versuche über Luftschraubenschwingungen. By Fritz Liebers. Published in *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, May 14, 1932, p. 251. **[A-1]**

A formula for calculating the vibration frequency of propellers has been checked experimentally by a series of model tests herein described. The formula is admitted to be subject to a theoretical error of 7 per cent, but the actual errors as determined by the model tests were considerably less. The deviations between the calculated and the test results were uniformly less than 4 per cent.

L'Exploration de la Stratosphère par Ballon Sphérique. By François Baudot. Published in *La Technique Moderne*, May 15, 1932, p. 369. **[A-1]**

Detailed technical information as to the construction of the spherical balloon in which Professor Piccard made his famous ascension into the stratosphere is given in this article. A summary of the results of the exploratory trip also is presented. The basis of the article is a paper read by Professor Piccard at the Sorbonne University.

"Wires Cut" Cases in Wing Structures. By A. E. Russell. Published in *The Aircraft Engineer*, supplement to *Flight*, March 25, 1932, p. 260a (17). **[A-1]**

In the preface to this article the editor points out that the breaking of a lift wire seems rather terrifying, and adds that, by calculations based on the usual assumption of ignoring redundant incidence bracing, the loads found in the center section certainly are very severe. However, the fact that many hundreds of wires have broken in the air without causing disaster shows that normal assumptions do not give results approaching the true state of affairs.

Mr. Russell points out that the method used at the Royal Aircraft Establishment assumes a similar wire broken on the opposite side of the wing structure, thus producing symmetrical loading. The method is based on investigations conducted at the R.A.E., the results of which have not been published. Mr. Russell has made certain general calculations and gives the results in this article.

Twelfth Rhön Soaring Contest, 1931. By Walter Georgii. Translated from *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, Feb. 29 and March 14, 1932; Verlag von R. Oldenbourg, München und Berlin. N. A. C. A. Technical Memorandum No. 671, May, 1932; 15 pp. 16 figs. **[A-4]**

Report of Committee on Airport Drainage and Surfacing. Published by the Aeronautics Branch of the Department of Commerce, 38 pp. **[A-4]**

To assist in a solution of the problems of airport drainage and surfacing, the Hon. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, organized a cooperative committee, composed of representatives of the aeronautics branch of the Department of Commerce, the American Engineering Council and the American Road Builders' Association, to undertake the necessary studies.

This committee, which was formed in the spring of 1930 under the chairmanship of Harry H. Blee, director of aeronautic development of the Department of Commerce, was charged with the responsibility of making a thorough study of the problems of airport drainage and surfacing, collecting and correlating available information and experience and preparing a report setting forth its findings and recommendations.

The Savage Projector. Published in *Flight*, Jan. 22, 1932, p. 68. **[A-4]**

The newly developed light projector produced by Major Jack Savage is described as a notable advance over existing projectors and of special interest from the viewpoint of air defence.

The model described in this article is a mobile unit, consisting of a Tilling-Stevens gasoline-electric chassis upon which the projector is mounted. The engine and generator are stated to be of sufficient capacity to supply all the current needed both for operating the light and for driving the unit.

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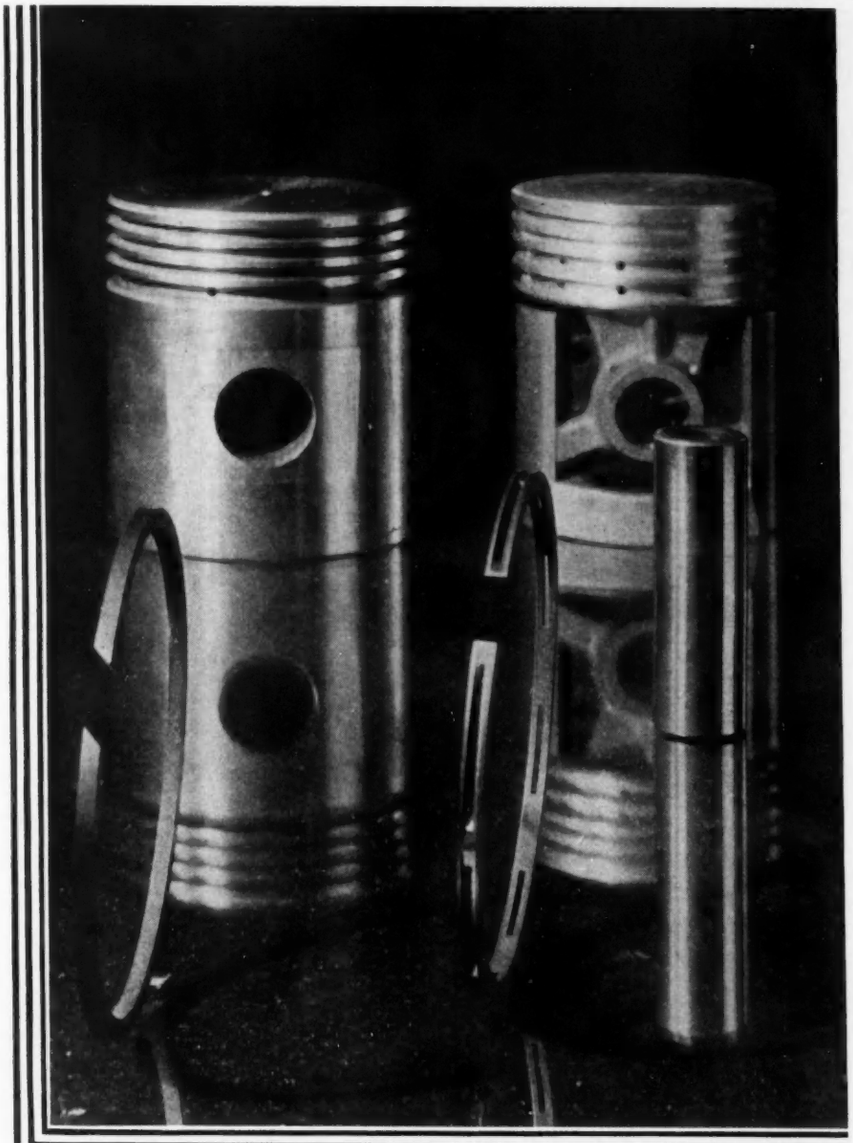
STRAIGHT LINE ENGINEERING



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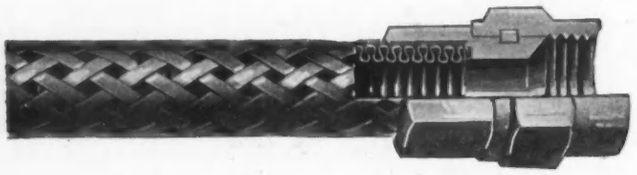

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Notes and Reviews

Continued

The projector consists of a barrel, the front end of which contains the source of light, while the rear end is purely the projector. The light is produced by a straightforward automatic arc lamp set in front of a very large parabolic reflector. It has a candlepower of 3,000,000,000, which is obtained through the ability of the projector to extrude the main beam in a series of parallel rays.

The first application of the beacon is for finding the speed, height and direction of flight of enemy aircraft. For this, the image plate is arranged so that the beam projected is of honeycomb cross-section. After a plane has crossed one of the lines, its speed, height and direction can be determined by a simple method. The projector can also be used as an effective landing light, is said to be extremely good for piercing fog, and the rays of the beam can be set to act as a code for use as a recall signal at night.

Safety in Spinning. By H. B. Irving. Published in *The Journal of the Royal Aeronautical Society*, March, 1932, p. 145. **[A-4]**

In this paper the author gives an account of the work on spinning and the progress made since L. W. Bryant and S. B. Gates made the report entitled, The Spinning of Aeroplanes, which was published in *The Journal of the Royal Aeronautical Society*, July, 1927, and reviewed in this column of the September, 1927, issue.

A short account is given of the nature of the motion in a spin and the forces and moments set up, together with some consideration of the kind of moment—rolling, pitching or yawing—which is likely to be most effective in putting a stop to the spin.

From the point of view of recovery from the spin, the author reviews the model work which has been done both in the wind-tunnel and by free-flight dropping tests and points out the distinct and complementary functions of these two types of experiment. The model experiments include the effect of various modifications of the shape and arrangement of the tail plane, fin and rudder, seaplane floats, differential, rigged up and floating ailerons and interceptors and alterations in the moments of inertia of the airplane.

Developments in the technique of full-scale experiments are reviewed, including the question of the determination of the moments of inertia. This is followed by the presentation of spinning diagrams, calculated from model data, for a number of airplanes, and these are discussed in the light of such full-scale data as have been obtained on them, with particular reference to recovery.

Accidents in Civil Aviation. By A. G. Lamplugh. Published in *The Journal of the Royal Aeronautical Society*, February, 1932, p. 93. **[A-4]**

This article constitutes a résumé and analysis of published statistics on accidents in civil aviation in various countries. The difficulties of making comparisons between the statistics for different countries are pointed out, but some general conclusions are drawn by the author and some possible remedies offered.

Fire Extinguishers. By Jerome Lederer. Published in *Aviation Engineering*, January, 1932, p. 18. **[A-4]**

The Underwriters' classification of aircraft fires is considered and the more suitable types of extinguisher for the various uses are described. The mounting, inspection, servicing and instructions for use of both fixed and portable types are discussed.

BODY

L'Atelier de Menuiserie dans la Carrosserie Automobile. By A. Antoni. Published in *La Technique Moderne*, April 1, 1932, p. 193. **[B-5]**

The extent to which machinery is used in the quantity production of automobile bodies has been commented on in a previous article and such equipment as drying rooms and conveyors has been described. In this article attention is concentrated on the machine-tools used in the carpentry work and details are set forth of equipment for performing such operations as molding, mortising, boring and tonguing and grooving.

CHASSIS PARTS

An Investigation of the Performance of Gears. By J. H. Hyde, G. A. Tomlinson and G. W. C. Allan. Paper presented before the Institution of Automobile Engineers, London, April, 1932. **[C-1]**

The investigations described in this paper were started some years ago when a gear-testing machine, complete with two sets of

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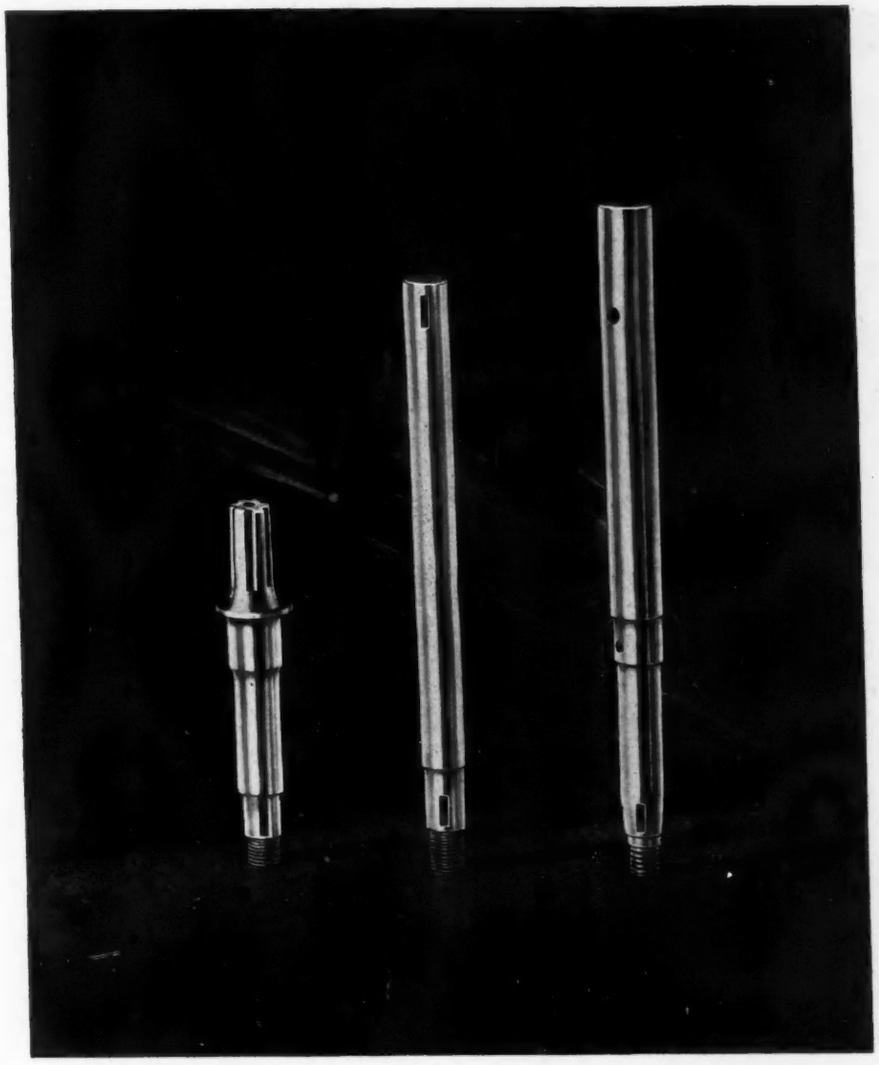

HEAT MUST NOT HAMPER ITS FUTURE

Straighter, smoother, broader roads . . . longer, faster runs . . . each new model must be capable of higher speeds and greater endurance than its predecessor. • Today a lazy cooling system will ruin the reputation of any car. It's the pump shaft, the heart of the cooling system, that usually causes the trouble. A little rust—and it reams out the packing. The leak which follows condemns the car. • You can't satisfactorily plate a shaft, but you can make it of "Stainless." That's what other manufacturers are doing. Stainless Steel is now available in a wide range of physical properties. It is immune to rust and is tougher than ordinary steel. • Genuine Stainless Steel is manufactured only under the patents of American Stainless Steel Co., Commonwealth Building, Pittsburgh, Pa. • Write for our new booklet.

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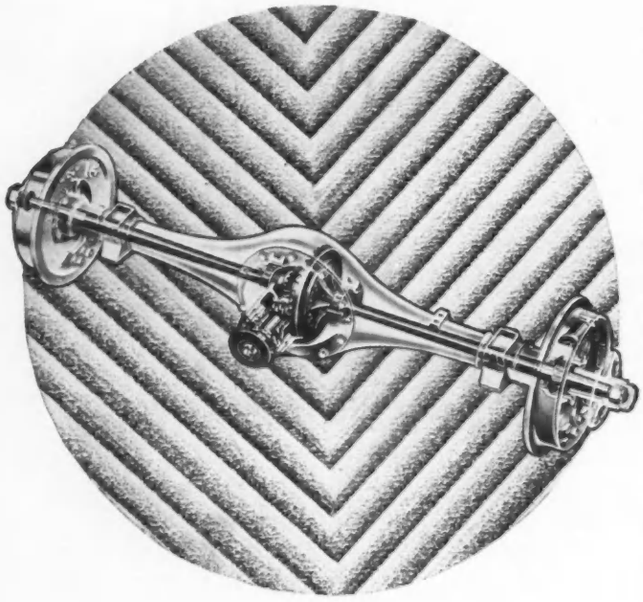

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Notes and Reviews
Continued

helical gears, was presented to the National Physical Laboratory. Preliminary tests showed that the efficiency could be measured on this machine with very high precision and the results indicated that gears running under normal loads had a considerably higher efficiency than was generally supposed at the time. Results of the tests of the original helical gears are given following a description of the machine.

Several years later a question of making experimental tests to study the properties of hardened spur gears with ground teeth arose. The machine was readily adapted for this purpose and at that time an accurate gear-inspection equipment also had been developed. Therefore, an investigation of the efficiency, wear, endurance and strength of ground gears was undertaken. The results of this later investigation are also reported in this paper.

ENGINES

Torsional Vibration of Aircraft Engines. By Karl Lürenbaum. Translated from *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, Feb. 29, 1932; Verlag von R. Oldenbourg, München und Berlin. N. A. C. A. Technical Memorandum No. 672, May, 1932; 16 pp., 17 figs. [E-1]

The Mutual Influence of Engine and Airscrew Characteristics. By J. D. Blyth. Published in *The Aircraft Engineer*, supplement to *Flight*, Feb. 26, 1932, p. 174a (9). [E-1]

Improvements effected in the course of development of modern aircraft engines and airplanes make increasingly difficult the designing of an airscrew that will absorb and use to the fullest extent, under all operating conditions, the power given out by the engine. This is especially so in cases where the highest possible top speed in level flight combined with the greatest possible rate of climb is essential.

The author contends that the increased horsepower of airplane engines, however obtained, results in producing a steeper slope in the curve of brake horsepower against airscrew revolutions, since the maximum rotational speed of the airscrew is limited by practical considerations of tip speed.

As a result of the investigation reported, the author concludes that, with a fixed-pitch airscrew, a low gear-ratio will lead to a loss of revolutions per minute and, therefore, of brake horsepower, but that the increase in propulsive efficiency of the airscrew will more than counterbalance this loss and lead to improved performance. This seems to supply the answer to the question as to what is the best gear ratio; namely, that which will give the largest permissible airscrew diameter. Since the variable-pitch airscrew gets over the trouble of holding down, the same applies even more strongly to its case.

The article is continued in the March 25 and April 29, 1932, issues of *Flight*.

Up from 1925 Flexible Engine-Mounting Progress to Damping of Torsional as Well as Reciprocatory Vibration. By P. M. Heldt. Published in *Automotive Industries*, Feb. 6, 1932, p. 184. [E-1]

Until recently the general principle followed in making installations of reciprocating engines was to mount them on foundations as heavy and rigid as could be conveniently provided. In the operation of all reciprocating engines certain periodic unbalanced forces are produced, and it was correctly reasoned that, the larger and heavier the mass to which the engine was bolted down, the smaller would be the amplitude of the vibrations resulting from these unbalanced forces.

Since 1925, the author points out, the practice of providing a flexible engine-mounting has increased. The progress in this development is reviewed briefly, with special attention to the mounting of the engine in the Plymouth car for 1932.

Turbulence in Combustion Chambers. By A. E. L. Chorlton. Published in *Engineering*, Feb. 26, 1932, p. 237. [E-1]

This article is a brief résumé of the growth of knowledge regarding turbulence, from early times to the present day, with particular attention given to the various devices employed in the production of turbulence.

Fuel-Injection Systems for High-Speed Oil Engines. By H. O. Farmer and J. F. Alcock. Published in *Proceedings of the Institution of Mechanical Engineers*, 1931, vol. 120, p. 517. [E-1]

This paper is a comprehensive treatise on the fuel-injection systems employed in oil engines of the small high-speed type,

(*Continued on next left-hand page*)

THE LATEST DEVELOPMENT OF HAD PRODUCTS

Among the long list of notable accomplishments that have placed HAD products in a position of unusual leadership . . . are the four developments shown below! Just drop us a line and we'll gladly tell you all about them!

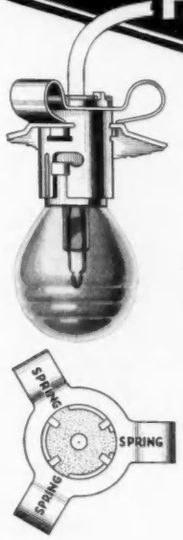
THESE NEW SNAP TERMINALS

GIVE MAXIMUM ASSEMBLY SPEED AT LOWEST COST

An easy hook-up and quick assembly! Just drop the body on to the chassis—snap in three wires—and the body and chassis lights are ready. Eliminate the old-fashioned awkward, unhandy and expensive methods of wiring connections. Junction blocks for all purposes for connections from one to twenty.

The new long taper terminal cannot come loose and assures a positive contact under all conditions.

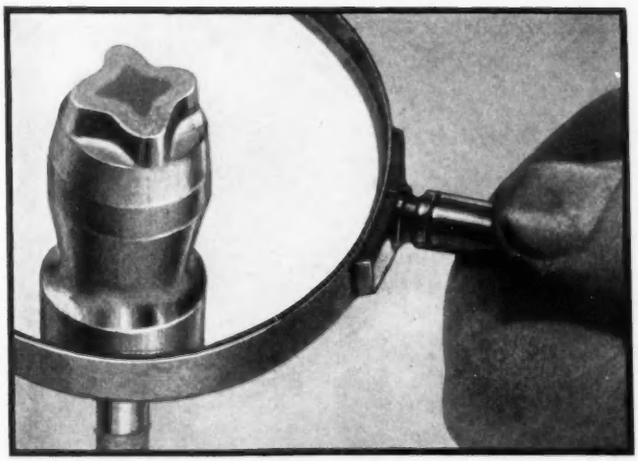
HAD CORRECT PRINCIPLE -FIXED FOCUS SOCKETS



Again, it has remained for Douglas Engineers to make the most vital part of the lighting system the strongest!

The three lugs make a three point bearing and hold the lamp base in its accurate position! The three springs directly over the three lugs with their three point suspension create perfect gauging, with no reflector distortion!

Lamps cannot get out of focus because each spring acts independently to hold its side of socket body in place!



SWEDGED-ON TERMINALS

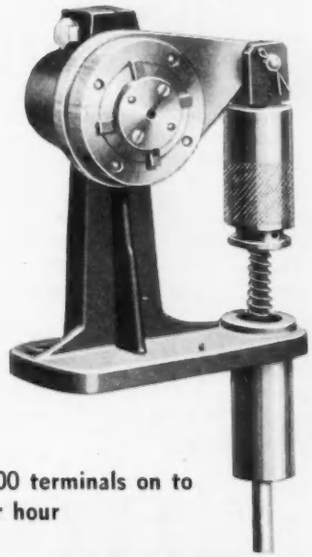
The actual photo, above, of the new HAD Swedged Snap Terminal . . . (enlarged six times) . . . clearly shows how tightly the copper wires and the brass portion of the terminal are SWEDGED together . . . at the top!

In fact, the top is one solid piece of metal . . . with only a difference of color showing where the copper and brass meet!

Here is the perfect, non-corrosive, solderless and economical Swedged Snap Terminal!

The Machine We Furnish SWEDGES ON TERMINALS

For every electrical connection on YOUR CAR It Saves $ When Used with HAD Stop, Door, Lighting, P & P or Toggle Switches With HAD Sockets or Terminal Plugs With HAD Junction or Fuse Blocks



This machine swedges 400 terminals on to the wire per hour

H. A. DOUGLAS MFG. CO. BRONSON, MICH.

THE PYROMETER REGISTERED

800°

Yet the lining was still in excellent condition

A temperature of 800° is obviously not encountered on many brake installations. Nevertheless, the fact that a Rusco Lining could withstand such operating conditions with no noticeable ill effects is striking evidence of its remarkable heat-resisting qualities.

Full details on the test in question are as follows: A truck loaded with a gross weight of 12,000 lbs. was allowed to free wheel for a distance of 1 mile on a 10% grade, being held to a speed of 12 M.P.H. by means of the emergency brake lever. Emergency brake was of the disc type mounted on propeller shaft, and brake linings consisted of two pieces, each containing 15 square inches.

During the 5½ minutes of the test, the pyrometer registered an operating temperature of 800°, the brake linings absorbed a total of 5,800,000 ft. lbs. of energy and the brake disc became red hot. Yet the linings, when removed, showed an average wear per piece of only .021 and were still in excellent condition.

Complete performance data on Rusco Linings for your brake will be furnished gladly upon request. Address Engineering Department B-82, The Russell Manufacturing Company, Middletown, Conn. Incorporated 1834.

RUSCO

WOVEN, MOLDED and MOLDED-WOVEN

BRAKE LININGS

Notes and Reviews

Continued

attention being confined to the airless or mechanical-injection systems. The characteristics required in injection systems are reviewed and the theoretical aspect of the fuel-pump is considered in detail. The last part of the paper includes a report on a series of fuel-pump tests made in behalf of the director of scientific research of the British Air Ministry and performed in the laboratory of Ricardo & Co.

Mixture Distribution in Cylinder Studied by Measuring Spark-Plug Temperature. By Hector Habezzana and Stephen Kalmar. Published in *Automotive Industries*, March 19, 1932, p. 450. **[E-1]**

The modern automobile engine with its high speed, high compression and multitude of cylinders is prone to suffer from faulty mixture-distribution at certain speeds and loads. Incorrect mixtures received by certain cylinders often are the cause of ignition miss, detonation, spark-plug fouling and carbureter backfires.

Need exists at present, the authors contend, for a routine test for mixture distribution; that is, a test which will give directly the relative leanness or richness of cylinder mixtures under all operating conditions.

The merits and disadvantages of some of the methods now in use for checking the mixture characteristics are summarized, including the exhaust-gas-analysis method, indicator cards, specific-fuel-consumption curves, $CO + H_2$ recorders, spectrographs, liquid-fuel distribution and the checking of weak cylinders. The combustion-temperature method, using thermocouples imbedded in the center electrode of spark-plugs, has been developed as a routine test procedure by the authors and their associates in the dynamometer laboratory of the AC Spark Plug Co. and is asserted to be as accurate an index of air-fuel ratio as CO_2-curve or indicator-card data.

The application of the temperature method to multi-cylinder engines is covered in a second article by the same authors, which appears in the March 26 issue of *Automotive Industries*.

How Much Power Can an Engine Produce? By Earl Bartholomew. Published in *Automotive Daily News*, April 30, and May 3, 4 and 5, 1932. **[E-1]**

The author sets forth the following methods that may be pursued toward obtaining increased engine power: (*a*) increased cylinder dimensions, (*b*) increased number of cylinders, (*c*) increased speed, (*d*) increased manifold pressure by supercharging and (*e*) improved engine efficiency. He discusses their respective advantages and disadvantages, together with the problems attendant upon the changes suggested.

As a result of his analysis, Mr. Bartholomew concludes that the most satisfactory way of increasing engine power is through the high-compression method and predicts that manufacturing economies of the nature outlined will be exploited to the limit in the not distant future.

This paper was presented before the Cleveland Section of The Society.

Les Moteurs Diesel dans une Exploitation de Transports Automobiles. By A. Audouin. Published in *Journal de la Société des Ingénieurs de l'Automobile*, April, 1932, p. 1722. **[E-1]**

A résumé of results obtained in road tests of Diesel-powered motor-trucks is presented. The engines tested embodied three different types of combustion chamber, two and four-stroke cycles, and ranged in capacity from 40 to 90 hp. and in speed from 1200 to 1600 r.p.m.

Starting of the Diesel engines is stated to have been satisfactory, provided the starting equipment was sufficiently powerful to provide the higher torque required as compared with the gasoline engine. In maintenance, lubrication and fuel economy the Diesels were found to have an advantage over the Otto-cycle type. However, in noise, smoky exhaust and odor they had serious drawbacks, which, in the opinion of the author, must be remedied before they can be successfully exploited commercially.

Formation et Rôle des Peroxydes Alcolyques dans le Phénomène du Choc des Moteurs à Explosion. By A. Boutaric. Published in *Le Génie Civil*, May 7, 1932, p. 465. **[E-1]**

Mondain Monval and Quanquin, whose detonation theories are here set forth, base their explanation on a study, by the use of a closed bomb, of the oxidation of hydrocarbons, particularly under the influence of temperature and pressure. These experimenters agree with Moureu and Dufraisse and Callender that the basic cause of detonation is the formation of peroxides. How-

(*Continued on third left-hand page*)

America's Choice *for* 1932
..*the safest tire ever built*—
25.9% more Sales prove it

JOIN THE SILVERTOWN SAFETY LEAGUE

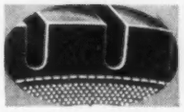
Sign the Safe Driver's Pledge. Display the League Emblem on your car. The nearest Goodrich dealer will enroll you. There's no cost.

WITH deaths and injuries from automobile accidents increasing every year, American motorists *know* that in 1932 they need more tire safety than ever before. Greater driving speeds—quick brake action—smooth, oil-filmed roads—added traffic congestion—all make new demands on *tires*.

That's why the new Safety Silvertown—*safest tire ever built*—was developed. Were the American people ready for it? Here's the proof: 25.9% *more Silvertowns have been sold this year than in the same period last year.*

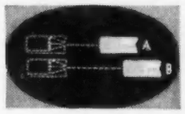
You don't pay one cent more for the extra safety and mileage in the Safety Silvertown. The price is the same as that of any standard tire. There is a Goodrich dealer near you. Ask him to go over with you the safety features described below. Put on a set of Safety Silvertowns and notice the difference in the behavior of your car!

15% Thicker Tread



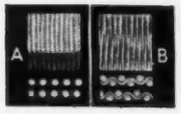
New Safety Silvertowns provide thousands of additional anti-skid miles—safe motoring. Husky cleats of tough rubber continue to grip the road long after the ordinary tread has become unsafe.

Better Grip on the road



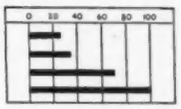
The dynamometer test proves Safety Silvertowns bring you to a safe stop at (A). The next best anti-skid tire in the test brings you to a stop at (B). Safety Silvertowns provide positive control.

Greater Protection against blowouts



Silvertown Cords (A) lie flat—completely embedded—floating in live rubber. Ordinary fabric (B) has cross threads which chafe cords, causing damaging internal friction. Goodrich Full-Floating Cord Construction gives greater strength, prolongs tire life.

Silence—less nerve fatigue

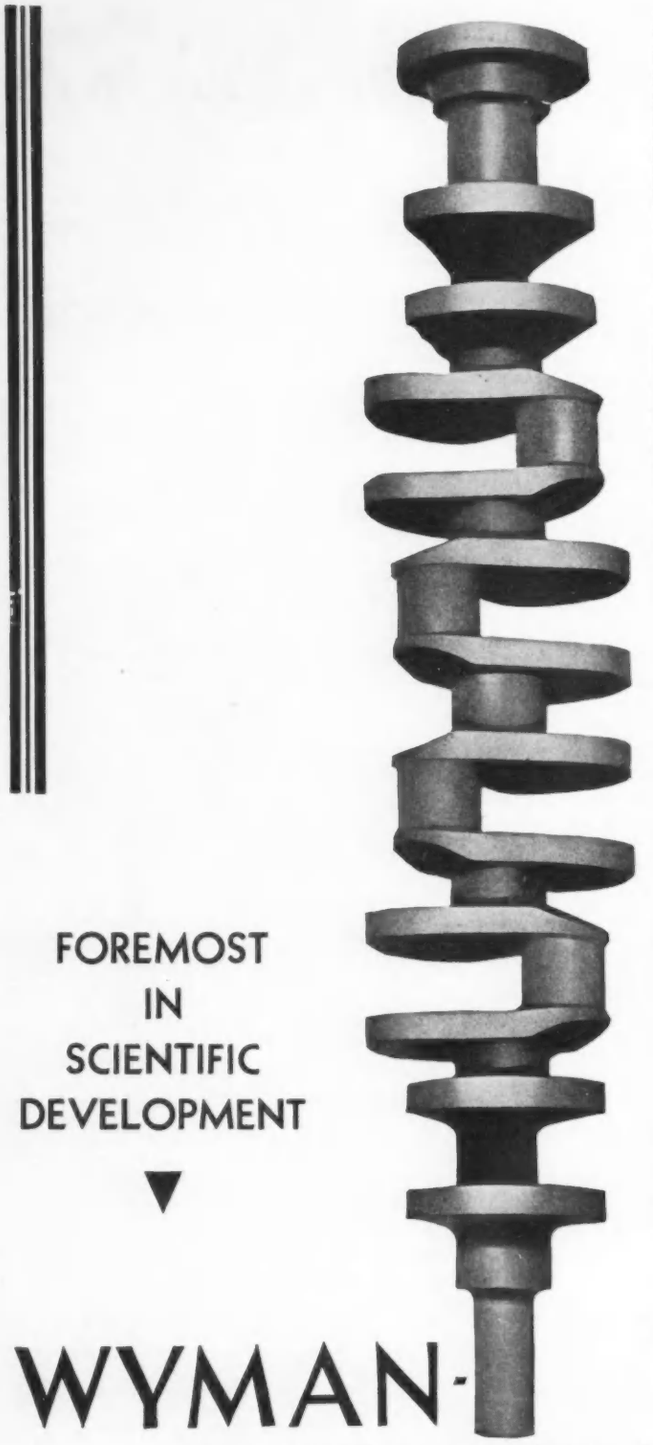


The electrical ear in the Burgess Laboratories proved the silence of Safety Silvertowns. Top line indicates silence of Silvertown Tire. Lower lines indicate operating noise of three other makes. Now—silent speed—less nerve fatigue.

Goodrich
Safety Silvertown

Copyright, 1932, The B. F. Goodrich Rubber Company

ANOTHER B. F. GOODRICH PRODUCT—32,000 rubber articles, representing more than a thousand distinct rubber products—Goodrich Silvertowns · Zippers · Rubber Footwear · Drug Sundries · Soles · Heels · Hose · Belting · Packing · Molded and Hard Rubber Goods



Notes and Reviews

Continued

ever, they believe that the alcoholic peroxides which are formed result from a complete dismemberment of the hydrocarbon chain and that they give rise to detonation, not by causing spontaneous combustion, but by increasing the rate of flame travel.

The Present Status of the Small, High-Speed Diesel Engine for Marine Service. By Frederick H. Dutcher. Published in *Motorship*, February, 1932, p. 72. **[E-4]**

The author contends that the small Diesel engine shows certain advantages over the gasoline engine for motorboat service. He compares the general characteristics, price per horsepower and the relationship between pounds per cubic inch and dollars per pound of a typical group of Diesel engines with equivalent gasoline engines.

While these comparisons indicate that, from one point of view, the oil engine must be developed still further to place it on an equal competitive basis with the gasoline engine, they also indicate the great strides that already have been made in developing a reasonably fast-turning medium-weight engine of thorough reliability and low operating cost.

MATERIAL

Torsional Fatigue Tests of Cold-Drawn Wires. By F. C. Lea and J. Dick. Published in *Proceedings of the Institution of Mechanical Engineers*, 1931, vol. 120, p. 661. **[G-1]**

The method of gripping the specimens in conducting fatigue tests is shown to be of great importance. The authors explain that, in most of the recognized testing machines and in repeated torsion-testing machines, the difficulty is overcome by using specially prepared specimens. These are machined or ground in such a way as to assure that a chosen section shall be the most highly-stressed portion of the specimen, and that fracture, if any occurs, shall take place where the stresses are known.

However, when the desire is to find the effect of some process of manufacture on a piece of metal, such preparation defeats the object of the test. This is apparent in the case of testing cold-drawn wire or heat-treated specimens, where it has been shown in a previous report by one of the authors that grinding off the surface of such a specimen may result in a considerable increase in resistance to fatigue of the material concerned.

Various methods of overcoming this difficulty were investigated, one that met with some success is described and results of tests on wire and helical springs are tabulated and shown graphically.

The Fatigue Resistance of Spring Steels. By G. A. Hankins and M. L. Becker. Published in *Engineering*, Jan. 29, 1932, p. 141. **[G-1]**

In the condition in which springs generally are used, the surfaces are not polished, and experiments by various investigators have shown that under such conditions the fatigue resistance of the material is much lower than it would be if the surfaces were machined and polished.

The authors state that examination of the general problem of the effect of surface conditions on the fatigue failure of spring steels suggests that the following four factors may be of major importance: (*a*) surface irregularities of shape, such as small pits, lines and scratches; (*b*) surface cracks formed in the heat-treatment; (*c*) a defective layer at the surface of the metal such as might be caused by decarburization and (*d*) internal stresses at or near the surfaces of the metal.

These factors are being investigated in detail at the National Physical Laboratory, and the present paper describes experiments that have been carried out on spring steels in regard to the second and third factors.

Magnetic Superhardening and Stabilization of Metals. By Edward G. Herbert. Published in *American Machinist*, March 24, 1932, p. 385. **[G-1]**

In this third article of a series that has appeared in *American Machinist* in recent years, the author unfolds a new theory of magnetic stabilization of metals at hardness levels considerably in excess of that induced by quenching or work-hardening. The practical results are said to be that cutting-tools of many types and shapes can be superhardened at slight expense in equipment and labor and that small wearing surfaces of machinery can be made more satisfactory, probably permitting the substitution of lower-grade materials.

Highways Glisten with Deep-Sea Lusters. By Joseph Geschelin. Published in *Automotive Industries*, March 5, 1932, p. 384. **[G-1]**

(Continued on next left-hand page)

IF THERE WERE ONLY TWO TELEPHONES IN YOUR TOWN

IF THERE were only two telephones in your town the fortunate possessors would probably put them on pedestals in the most prominent places in their homes. Neighbors would flock to see them. Children would clamor to touch them. Bolder ones would lift the receiver to hear the magic voice—then hang up suddenly in bewilderment.

Because the telephone is in millions of homes and offices and is so much a part of our daily lives, it is not regarded with this strange awe. Yet the miracle of the telephone is no less real. The magic of it no less powerful. At any hour of the day or night you can talk to almost anybody, anywhere—to far countries and to ships at sea. The first wonder is that you can talk to folks around the corner. The second wonder is that the service is so organized that you can talk to people in far away lands. The third wonder—perhaps the greatest of all—is that telephone service is so inexpensive.

Of all things purchased, there is none that costs so little and brings to you so much convenience, so much security and achievement as the telephone.

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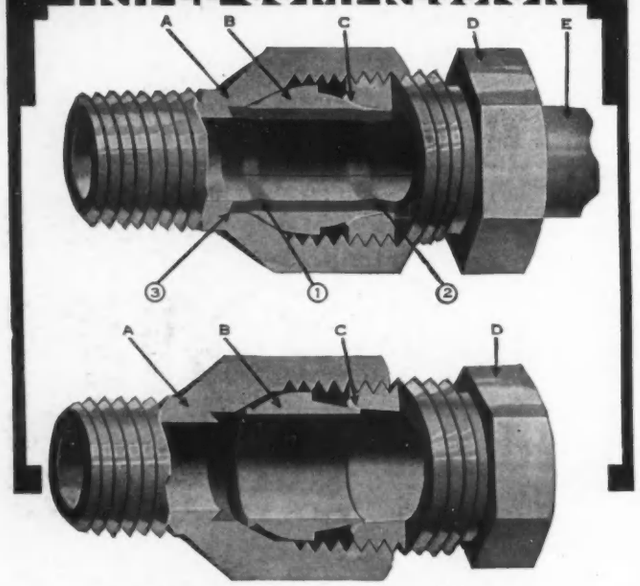

WITHOUT TUBING – BEFORE COMPRESSION

(1) First Compression
(2) Second Compression
(3) Third Compression
Patented February 3, 1931 No. 1,791,121

(A) Body
(B) Sleeve
(C) Solder Bearing
(D) Nut
(E) Seamed Tubing

Approved by the Underwriters Laboratories

HERE is the result of supreme engineering effort and experience to provide a single type of compression coupling to fit universally all seamed or seamless tubing of steel, aluminum, brass or copper. It is no longer necessary to depend upon couplings of various designs and construction for joining differently constructed kinds of tubing.

This Dole Universal All-Tube Coupling of two piece design surpasses all for joining to seamed or seamless tubing—for safety against leakage—for holding under all strain and vibration—for simplicity of connection—no separate sleeves—no flaring—no soldering—for reconnecting speedily and without limit—*for ultimate satisfaction and economy.*

The coupling consists of only the body and the threaded sleeve screw. Repeated connecting will not reduce the efficiency. Finger turned except for the compression turn. The solder which holds the sleeve on to the nut is sheared off during compression, thus giving a lead lubricated bearing—an exclusive Dole feature.

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Notes and Reviews

Continued

Mr. Geschelin discusses the new opalescent finish that appeared on numerous automobile models at the 1932 show. The ingredients, source of supply, estimated durability based on laboratory tests and the lines at present being pursued in production of the finish, are touched on briefly in this article.

Studies on Determination of Sulphur in Gasoline. By Ralph H. Espach and O. C. Blade. Bureau of Mines Technical Paper No. 513, 1931; 22 pp. Price 5 cents. **[G-1]**

The authors present in this paper a study of a lamp-method test for determining the quantity of sulphur, by weight, contained in motor fuels. Several such tests are discussed. The reliability of determinations of sulphur in gasoline were studied, the Edgar and Calingaert modified apparatus being used for sulphur determinations in naphthas. Samples of gasoline were prepared by adding flowers of sulphur and various organic-sulphur compounds to different samples, and these were analyzed. The results of the sulphur determinations also are discussed.

Compression-Ignition Engine Tests of Several Fuels. By J. A. Spanogle. N.A.C.A. Technical Note No. 418, May, 1932; 10 pp., 7 figs. **[G-1]**

Influence of Tetraethyl Lead on Knock Rating. By L. E. Hebl and T. B. Rendel. Published in *The Journal of the Institution of Petroleum Technologists*, March, 1932, p. 187. **[G-1]**

The data on which this study was made were obtained in the course of a survey conducted to ascertain which gasolines are most suitable for the manufacture of marketable ethyl gasoline. The testing work was done on a Ricardo E-35 2-liter variable-compression engine. Determinations of antiknock are made on this engine by increasing the compression ratio until detonation just becomes audible, all other engine conditions being maintained constant. The antiknock value of the test sample is expressed in terms of this compression ratio, which is called the highest useful compression ratio, or H.U.C.R., of the fuel.

Gasolines made from various crudes and manufactured by different refining processes were doped with given concentrations of tetraethyl lead in the form of ethyl fluid. The increase in H.U.C.R. for different proportions of tetraethyl lead is shown in a table, and some interesting relationships between the effect of volatility on the H.U.C.R. and lead susceptibility, and the effect of composition of the gasoline on lead susceptibility, are discussed.

Analysis of Mineral-Oil Content of Lubricating Greases. By C. A. Fosler. Published in *National Petroleum News*, March 9, 1932, p. 35. **[G-1]**

Use of an average value for the viscosity of the mixed fatty acids resulting from decomposition of a grease is suggested. This value, the author contends, would provide an easy means of graphically estimating the viscosity of the mineral oil in grease from a determination of the viscosity of the separated oil. In the latter determination, reproducible results can readily be obtained. The tedious and frequently inaccurate separation of the mineral oil would then be unnecessary.

Mr. Fosler further argues that the use of an average viscosity value would correspond to the current use of an average saponification value and an average factor for the conversion of fatty acids to fat in accordance with standard practice in the analysis of grease.

The use of these values promotes agreement among laboratories and obviates the time-consuming measurement of the various constants required for identification of the fatty material.

The method is described and test results reported in Part II of the article, which appears in the March 16 issue of *National Petroleum News*.

Fuels for Aircraft Engines. By F. R. Banks. Published in *The Journal of the Royal Aeronautical Society*, February, 1932, p. 127. **[G-4]**

The first part of this paper concerns the relationship of fuel to engine design and operation, with particular reference to aircraft fuels, and includes a résumé of the present knowledge on detonation and the effects of tetraethyl lead in gasoline. The second part of the paper is devoted entirely to methods of testing and rating the antiknock values of fuels.

The author states his purpose in presenting the paper to be a desire to assist those engaged in airplane-engine design and operation to produce engines that will perform well with available fuels.

(*Concluded on next left-hand page*)

✓1926
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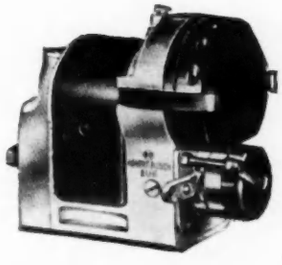
✓1931

✓and again in 1932 BOSCH WINS at Indianapolis . . .



Again at Indianapolis on Memorial Day the winning car, driven by Fred Frame, was equipped with Bosch Magneto Ignition. For 7 years in succession, every winning car at Indianapolis was Bosch Magneto-equipped. Such an unparalleled succession of triumphs is proof positive of the dependability you may expect from any Bosch product. This includes, among others, Bosch Super-Energy Magnetos, Bosch Pyro-Action Spark Plugs, Bosch Vibro-Balanced Horns, Bosch Generators.

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Starting Motors
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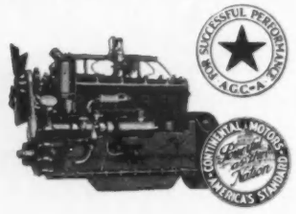

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Notes and Reviews

Concluded

MISCELLANEOUS

Neue Funkgeräte im Deutschen Luftverkehr. By Franz Eisner. Published in *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, May 14, 1932, p. 259. **[H-1]**

In the last year the German aircraft transportation firm, Luft Hansa, the central bureau for aircraft insurance, the German institute for aeronautical research and two radio firms have been working together in the development of radio equipment for aircraft. The author presents in this article the results of the cooperative efforts, describing the mechanical and electrical features of the apparatus and its operating efficiency, range and characteristics.

Practical Construction Manual. Reprinted from *Engineering News-Record*, New York City; 253 pp. **[H-3]**

The subtitle of this manual describes it as a collection of practical suggestions for saving time and labor on civil-engineering and construction work compiled from reprints of material appearing in *Engineering News-Record*. The sections on Surveying and Mapping, which includes topographical mapping; Roads and Streets; and Testing Materials are of interest from the automotive viewpoint, as are also the references to aircraft-hangar design under the section, Engineering Structures.

Economic Attitudes in Industry. By F. C. Caldwell, C. A. Norman and John Younger. Ohio State University Engineering Experiment Station Circular No. 26. January, 1932; 21 pp. **[H-3]**

The inquiry addressed to industrial leaders and economists, the results of which are reported in this leaflet, arose out of a desire on the part of certain members of the faculty of the College of Engineering at the Ohio State University to meet the ever more insistent demand that engineers be trained to understand and appreciate the social and economic implications of their work. It was felt that such training should take careful cognizance of the attitude prevailing in industry itself on implications of this kind. In consequence, several hundred leading industrialists and also a number of economists were sounded out on these matters. Their replies are summarized and analyzed.

MOTOR-TRUCK

Behälterverkehr. By A. Seifert. Published in *Automobiltechnische Zeitschrift*, March 25, p. 144, and April 10, 1932, p. 180. **[K-1]**

That international traffic containers may find a fertile field is the keynote of this article on this means of goods transportation. A brief review is given of container development to date in various countries, and an exposition of the economic significance of container usage is presented. The author then reports on the competition held in connection with the Paris business show, in which 23 container designs were entered. He describes the more important of these, explains the criteria on which the awards were based and tells of the practical tests made on the containers.

Les Bandages des Camions et la Route. By J. Delpeyroux. Published in *Le Génie Civil*, May 21, 1932, p. 518. **[K-4]**

What relationship exists between the tire equipment of a motor-truck and the extent to which it damages the road and is it justifiable to use such relationship as a basis of motor-truck taxation?

In seeking an answer to this question, the author reviews both road and laboratory investigations bearing on this point, made in Italy, Switzerland, France, Germany and this Country. From an analysis of the results, he concludes that the tire equipment is not the on'y nor the most important factor in road wear. Speed and weight of the vehicle, the unit pressure of the tires and the nature of the road surface have an even more important bearing. Certain considerations relating to operating practice and tire wear with different types of equipment are set forth and the author gives his vote in favor of cushion tires.

Amo and Nizhni-Novgorod Plants Lead Soviet Vehicle Plans. By Walter L. Carver. Published in *Automotive Industries*, March 12, 1932, p. 418. **[K-5]**

According to this author, the rapid transition from hand-made vehicles to their production in a plant incorporating the latest American high-production machinery is the most obvious development in Soviet progress toward supplying a great area with all its automotive needs.

A description of the production methods of the Amo and Nizhni-Novgorod plants is given, with the conclusion that Russia, as typified by her automotive industry, is definitely on the road to industrial progress.

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Present-day engineering demands Anti-Friction Bearings. In keeping with this demand comes Roller Bearings on Trunnions of Universal Joints. Their use finally lifts this unit to the same standard of engineering as that of the Road Wheel, Transmission, Axle, etc.

In the DETROIT Roller Bearing Universal Joint, the small Rollers are free, under the influence of variable shock-loads and angles, to creep to new positions around the Trunnions and at the same time rotate around their own axis. Mainly because of this characteristic behavior, these small Rollers withstand great loads at high angles with no appreciable rise in temperature.

Absence of heat, perfect control of lubrication and positive exclusion of dirt are the principal factors responsible for the long life of this new type of Universal Joint.

Already, three important Car Manufacturers are using this new Roller Bearing Universal Joint on their 1932 Models. This is an outstanding endorsement for a product in its first year of production.

We want every automotive engineer to have first-hand knowledge of the merits of this New Roller Bearing Universal Joint. We invite you to test them on the cars you build.

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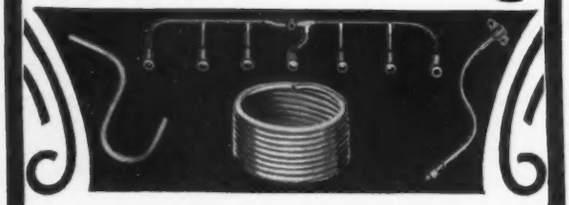

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Personal Notes of the Members

(Concluded from p. 37)

tiss Aeroplane & Motor Co., at Kenmore, N. Y., recently entered the employment of the Consolidated Aircraft Corp., of Buffalo, as chief checker on engine unit No. 3.

George A. Page, Jr., until recently design engineer of the Curtiss Aeroplane & Motor Co., of Buffalo, has been appointed chief engineer of the Curtiss-Wright Airplane Mfg. Co., of Robertson, Mo.

James M. Pratt, who was formerly vice-president of the National Railway Appliance Co., of New York City, assumed new duties on June 1 with Metropolitan Distributors, Inc., of New York City.

F. A. Quackenbush, having severed his connection with Crandic Stages, Inc., of Cedar Rapids, Iowa, which he had served in the capacity of superintendent for the last 2½ years, is now serving the Interstate Transit Lines in the capacity of division superintendent and has his office at Sioux City, Iowa.

William A. Ramming, Jr., was recently elected to the office of secretary of the John Ramming Machine Co., of St. Louis. His previous connection was with the Busch-Sulzer Brothers Diesel Engine Co., also of that city.

H. J. Ritter, assistant secretary of the Norma-Hoffman Bearings Corp., of Stamford, Conn., has also been made sales manager of the organization. To his new duties he brings the experience of years as sales engineer and, later, as manager of the New York City sales office for the corporation.

Thomas B. Roscoe transferred his connection last month as service manager from the Charles I. Rice Co., of Hackensack, N. J., to the Packard Bergen County Co., of the same city.

C. H. Roth, who was president of the Roth Brothers & Co. division of the Century Electric Co., of St. Louis, was recently elected president of the Light Sensitive Apparatus Corp., of Niles Center, Ill., which manufactures oil-testers, smoke recorders and other apparatus.

Harold F. Schwedes, formerly tool designer for the American Airplane & Engine Corp., of Farmingdale, N. Y., has accepted a similar position with the Berliner Joyce Aircraft Corp., of Baltimore.

Joseph P. Seghers, who was service and parts superintendent of the Moreland Motor Truck Co., at Portland, Ore., was recently appointed Northwest manager for the company, with headquarters at the Portland branch. He has been connected with the Moreland company for the last six years.

Perry L. Tenney, having severed his connection as chief engineer of the Muncie Products Division of the General Motors Corp., in Muncie, Ind., has entered the service of the Olds Motor Works, of Lansing, Mich., in the capacity of engineer in the transmission division.

John R. Thonger resigned his position as sales engineer of the Harley-Davidson Motor Co., of Milwaukee, on June 1 and has gone to England, where he will practice consulting engineering in London.

Ernest von Mertens, formerly engineer of the Scintilla Magneto Corp., of Sidney, N. Y., assumed new duties the middle of June as engineer on production and development with the Groove Pin Corp., which is located in Long Island City, N. Y.

Herbert C. Walters is now employed in the engineering department of the Scintilla Magneto Co., Inc., of Sidney, N. Y. His former position was as chief engineer of the Delco Aviation Corp., of Dayton, Ohio.

Karl H. White, former design engineeer with the Curtiss-Wright Airplane Co., of Robertson, Mo., has been appointed engineer in charge of the physical testing laboratory at the Naval Aircraft Factory, at Philadelphia.

John G. Wood was recently appointed chief engineer of the Olds Motor Works, of Lansing, Mich. His former connection was with the Muncie Products division of the General Motors Corp., at Muncie, Ind., of which he was general manager.